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**VENEZUELAN AND CARIBBEAN  
TURRITELLAS**

**WITH A LIST OF VENEZUELAN TYPE STRATIGRAPHIC  
LOCALITIES**

*(Presented to the Graduate School of Cornell University in  
partial fulfillment of the requirements for the degree of  
Doctor of Philosophy)*

**By**

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*June 17, 1926*

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## INTRODUCTION

This article is based on more than two years of field work in Venezuela unraveling the stratigraphy and paleontology of certain areas for one of the American companies operating in that country. We propose here to describe some of the new material collected during this investigation with general reference to type localities and general age determination.

At some future time when the interests of the company for whom the work was done permit, we hope to publish more definite information as to the exact locality of each collection, the type sections, and the stratigraphic range and age determination of the species described.

## STRATIGRAPHIC FORMATIONS AND THEIR TYPE LOCALITIES

The formations which we have found it convenient to use are recorded in alphabetical order and the type locality for each is indicated:

1. *Agua Clara series*: Chiefly black clay-shale. Type locality—around Agua Clara, District of Democracia, State of Falcón, Venezuela.

2. *Cerro Pelado series*: Alternating conglomeratic sandstones, black shales, and coals. Type locality—Cerro Pelado range, Districts of Democracia and Miranda, State of Falcón.

3. *Codera formation*: Variegated clays and sands. Type locality—just south of Codera de Dentro, District of Democracia, State of Falcón.

4. *Damsite series*: Chiefly limestones, clays and soft sandstones. Type locality—Damsite at Caujarao, south of Coro, on Río Coro, District of Miranda, State of Falcón.

5. *El Paraíso shales*: Black shales with interbedded coals and quartzitic sandstone layers. Type locality—El Paraíso, in Quebrada El Paraíso, District of Bolívar, State

of Falcón.

6. *Guarabal conglomerates*: Conglomeratic sandstones, black shales and siliceous limestones. Type locality—just southwest of Guarabal, south of Coro, on the Coro-San Luis trail, District of Miranda, State of Falcón.

7. *La Puerta series*: Variegated, gypsiferous clays and sands. Type locality—La Puerta, southeast of Dabajuro, District of Buchivacoa, State of Falcón.

8. *La Vela series*: Variegated, gypsiferous clays and sandstones; the latter are sometimes conglomeratic. Type locality—In Río or Quebrada La Vela (also called Mata-ruca) about one mile northeast of La Vela de Coro, District of Colina, State of Falcón.

9. *Misoa Trujillo series*: Massive sandstones, frequently conglomeratic, interbedded with black shales. Type locality—Misoa Trujillo ranges, in eastern part of State of Zulia.

10. *Querales shales*: Chiefly black clay-shales with some sandstone members. Type locality—Querales, (southwest of Sabaneta), District of Miranda, State of Falcón.

11. *Patiecitos series*: Conglomeratic sandstones, black shales and siliceous limestones. Type locality—Quebrada de Los Patiecitos, near Las Alambiques, on the Coro-Cabure trail, Districts of Petit and Miranda, State of Falcón.

12. *Paují shales*: Chiefly black shale with interbedded dense sandstone layers. Type locality—Río Paují, eastern part of State of Zulia. (Paují shales of authors in part).

13. *San Luis series*: Foraminiferal limestones, interbedded with shales and sandstones; limestones and sandstones often conglomeratic. Type locality—San Luis range at point where the Coro-Cabure trail crosses it, District of Petit, State of Falcón.

14. *Socorro series*: Gypsiferous sandstones and variegated gypsiferous clay-shales. Type locality—Socorro, south of Urumaco, District of Democracia, State of Falcón.



## ACKNOWLEDGMENTS

Mr. S. H. Williston, of the Venezuelan Sun Company, brought his collection of Falcón fossils to Cornell University and described them here in the summer of 1923. His manuscript was not published, but where feasible, we have redescribed his species using his name and have given him credit for the species. Where possible, we have quoted his exact descriptions, but in most cases, due to our much larger collections, we have been able to supplement his work. In the cases where we have figured his specimens, acknowledgment is given in the explanation of plates.

Among the many people to whom acknowledgments are due for help and suggestions in this work, the following deserve special mention:

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Above all, I am indebted to my wife for invaluable aid in the field and in the laboratory, as well as in checking my work and manuscript.

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## DESCRIPTIONS OF SPECIES

### MOLLUSCA

#### CLASS GASTROPODA

|             |                 |            |
|-------------|-----------------|------------|
| Order       | Ctenobranchiata | Schweigger |
| Suborder    | Platypoda       | Lamarck    |
| Superfamily | Tænioglossa     | Bouvier    |
| Family      | Turritellidæ    | Gray       |
| Genus       | Turritella      | Lamarck    |

***Turritella zuliana*, n. sp.**      Pl. 1, figs. 1-6; Pl. 2, figs. 2, 3, 5, 6.

Shell of medium size, with large apical angle; whorls with scalloped carinæ, very concave in adult stages. Protoconch consists of about  $1\frac{1}{2}$  smooth round whorls. First two nepionic whorls are sharply medially carinate, angularly convex and almost smooth; the next three nepionic whorls become less convex, of which the first  $1\frac{1}{2}$  whorls carry two strong spiral threads about equally spaced behind the keel; the next  $1\frac{1}{2}$  whorls show sub-microscopic spiral threads in addition to four primary spirals; the primaries include,—the two spirals posterior to the keel, the thread which forms the keel in earlier whorls, and a thread which is developed on the anterior of the whorl just behind the suture. The sides of the first neanic whorls are almost flat but soon become concave; the basal or first anterior primary cord rapidly increases in size and begins to form the carina which is so conspicuous in the larger whorls; the concave neanic whorls carry four, about equally spaced, strongly beaded, large spiral cords with weaker threads of varying strength appearing in the concave portion between the posterior and anterior spirals as well as behind the posterior cord.



The adult whorls are decidedly concave with a produced scalloped flange or carina decorated with a reticulate, superficial ornamentation which likewise covers the remaining surface of the whorls; the spiral ribbing in the concave portion is less pronounced and more subdivided; the sigmoidal, close-set, prominent growth lines are strongly retractive on the upper half of the whorl, swing forward to the edge of the keel and are again strongly retractive on the base of the whorls. The sutures are compressed and rather inconspicuous, except in the gerontic stages when a wide V-shaped depression may lead down to the suture. The keel or carina in the adult whorls usually projects out straight from the base, but frequently, even in the larger whorls of the same specimen, the keel may turn down anteriorly or up posteriorly or may be moved posteriorly from the base almost a third of the whorl length. In the latter case, the base of the keel is slightly concave and ornamented with numerous spiral threads.

This is one of the most ornate of our Venezuelan species. It does not bear a very close resemblance to any other form. The large, scalloped, knobby keel is very characteristic. This species is easily distinguished from the more slender *T. montañitensis* (n. sp.) by the much longer whorl lengths of the latter, as well as by an entirely different character of spiral ribbing in all stages.

*Age:* Oligocene-Miocene.

*Locality:* District of Miranda, State of Zulia. *Locality Numbers:* 6, 1140.

***Turritella zuliana palmeri*, n. subsp.**

Pl. 2, figs. 1, 4.

This subspecies is characterized by the more numerous (6-7) rather prominent, heavy, spiral cords instead of 4, the number of primary spirals usually found on the closely related species.

This increase in the number of spiral cords is probably due to the fact that the second anterior cord of *T. zuliana*

(n. sp.) became divided into two primaries and to the fact that some of the secondaries have increased in strength.

Named in honor of Dr. Katherine Van Winkle Palmer.

*Age:* Oligocene-Miocene.

*Locality:* States of Zulia and Falcón. Locality Numbers: 6, 1140, 2027.

***Turritella larensis*, n. sp.**

Pl. 3, figs. 1-5; Pl. 4, figs. 1,  
2, 4, 5; Pl. 5. fig. 4.

This *Turritella* is very abundant, very variable, and seldom well preserved. In examining several hundred specimens, we have found great variations in all its features; to try to establish close varieties or subspecies from the many variations would be hopeless. A few subspecies have been made to mark the limit in variation of some particular feature. Intermediate forms are considered as intergradations between species and subspecies.

Shell is rather large, heavy, and keeled in adult stages. Protoconch and first nepionic whorls were not found; later nepionic whorls are almost flat or slightly convex, with one strong, sub-medial, spiral cord, which in some specimens is double due to the appearance of a cord of variable strength just posterior to it. Immediately behind the suture, there is a faint anterior spiral which rapidly increases in strength in the succeeding whorls; there is a strong upper spiral on the posterior fifth of the whorl; on each side of the medial spiral rib there is a concave interspace in which weaker spiral lines appear; the medial or posterior intercostal area rapidly increases in size and carries 2 or 3 smaller, beaded, secondary spirals and some tertiary threads. In the adult whorls, the weak, anterior, post-sutural spiral of the younger whorls becomes a wide flange or keel of varying width, ornamented with fine revolving threads.

The adult whorls are more or less concave and the sides are ornamented with 3-5 (usually 4) stronger, beaded, spiral ribs and weaker intervening spirals; the strong sig-

moidal growth lines are retractive from the suture to the medial concavity, then curving forward, are protractive to the keel or carina and retractive on the base of the whorl; the superimposition of the growth lines over the spiral ribs forms beads or nodes on all the spiral cords; the finer superficial ornamentation has usually disappeared in slightly weathered specimens; the suture is overhung by the keel which generally projects more or less straight from the base of the whorl, but may turn up or down; if the keel turns up posteriorly, it is rounded on the base; if it droops anteriorly, it is concave on the base and tends to conceal the suture; although the keel may be very pronounced, it is regular in width and does not become scalloped as in *T. zuliana* (n. sp.); well preserved specimens show fine, superimposed, spiral threads on the keel.

It slightly resembles the pagoda-like *T. cauredalitoensis flensis* (n. subsp.) but is so different that a comparison is not worth while. It is much closer to *T. systoliata* Dall<sup>1</sup> from the Tampa silex beds and probably is derived from the same stock. The flange or keel on our specimens is more pronounced, the shape of the whorl and sculpture is somewhat different, but the *ensemble* shows a striking similarity.

It must be remembered that there are all degrees of variation between the species and its subspecies as well as between the subspecies themselves. The subspecies are established only to mark the limit of variation in certain directions.

*Age:* Oligocene-Miocene.

*Locality:* States of Lara, Falcón and Zulia. Locality Numbers: 10 (variation), 797, 811 (slender variation), 814 (with variations), 815, 822 (with variation), 1627 (and subspecies), 1760, 1761, 1940, 1955, 1958, 2018, 2019, 2019A, 2021 (and variations), 2022 (and variations), 2023 (and variations), 2024 (with variations), 2027, 2048

<sup>1</sup> W. H. Dall, Bull. 90, U. S. Nat. Mus., p. 99, Pl. 9, fig. 6, 1915.



(variation).

***Turritella larensis santiagana*, n. subsp.**

Pl. 4, figs. 3, 6;  
Pl. 5, fig. 2.

This subspecies differs in that in the later ephebic and gerontic stages it tends to lose its spiral ribbing and to become more nearly smooth. The whorls are concave and show more or less faint spiral striation even on weathered specimens. We are figuring a few intermediate forms to show its relation to the species, otherwise, it might be hard to believe that they belong to the same stock.

*Age:* Oligocene-Miocene.

*Locality:* District of Buchivacoa, State of Falcón. Locality Numbers: 1760, 1761, 2019, 2023 (a variation), 2027, 2048.

***Turritella larensis carrizalensis*, n. subsp.**

Pl. 6, figs. 1, 3, 4.

This subspecies is characterized by having three very prominent primary spirals on the adult whorls; it is the antithesis of the new subspecies *guaratarensis* in respect to the number of strong primary cords; it is a very large heavy form, however, and the anterior primary spiral tends to develop into a strong keel. It is the limit in variation of the species toward a few, very strong, pronounced spiral cords on the sides of the whorl; this subspecies is generally very similar to the species, but tends to be slightly larger and to have larger spiral cords.

*Age:* Oligocene-Miocene.

*Locality:* States of Zulia and Falcón. Locality Numbers: 10, 1290, 1398 (?), 2022, 2023, 2027, 2048, 2049 (*cf.*).

***Turritella larensis guaratarensis*, n. subsp.**

Pl. 10, figs. 1, 3.

This subspecies is coarser and heavier in size and sculpture. The whorls are more nearly flat-sided behind the basal flange. The adult whorls usually carry 5 or more strong, primary, spiral ribs and several weaker spirals of varying strength.

This subspecies marks the limit in variation toward having a large number of heavy spiral cords and developing a heavy shell.

*Age:* Oligocene-Miocene.

*Locality:* District of Buchivacoa, State of Falcón. *Locality Numbers:* 1938, 2021 (a variation), 2023, 2027.

***Turritella robusta* Grzybowski *fredeai*, n. subsp.**

Pl. 5, figs. 1, 3; Pl. 6, figs. 2, 5; Pl. 7, figs. 1, 6, 7; Pl. 9, fig. 7; Pl. 28, fig. 6.

The characteristics of *T. robusta* Grzybowski from Peru have been well reviewed by Spieker.<sup>1</sup> Our form is very closely related to this species, but is easily distinguished by the flatter, straighter-sided whorl behind the keel and by the much larger size of the shell. Depending on the size of the whorl, there are 6-9 spiral cords of varying strength and spacing behind the sharp keel; behind the anterior suture, there are 3 pre-carinal cords in the younger whorls; but in the large adult whorls there are 3 or 4 strong spirals with several weaker intervening ones in well preserved specimens. Behind the keel the growth lines are nearly straight, running diagonally from the posterior suture almost to the keel where they curve and take a vertical direction to the anterior suture; on the base of the whorl they are slightly protracted and cross about a dozen spiral threads of varying strength, giving a faint reticulate ornamentation. The pre-carinal spiral cord adjacent to the suture is rather faint in the younger whorls, but in the larger adult whorls it becomes very strong and produces a prominent shoulder which projects over the suture.

Named in honor of Mr. M. F. Fredea, of the Standard Oil Company of Venezuela, who collected some of our largest specimens.

<sup>1</sup> E. M. Spieker: The Paleontology of the Zorritos Formation of the North Peruvian Oil Fields, pp. 84-85, Pl. IV, fig. 5. The Johns Hopkins Press, 1922.

This subspecies somewhat resembles *T. larensis* (n. sp.) and its subspecies, but is easily distinguished by the flat straighter sides of the whorl behind the keel and by the straight growth lines. It attains a much greater size than any of the other Venezuelan species.

*Age:* Miocene.

*Locality:* Common in the State of Falcón. Locality Numbers: 70A, 70C, 72, 72C, 81, 83, 84, 86, 87, 90, 100, 149A, 149B, 169A, 210, 215, 307, 1233, 1398, 1600, 1856, 1875, 1892, 1928.

***Turritella hubbardi*, n. sp.**

Pl. 7, figs. 2-5; Pl. 8, figs. 1-6;  
Pl. 9, figs. 1, 5, 6.

Shell rather small, turreted, with two, strong, equal or subequal, basal, carinating, spiral cords, and a weaker primary spiral near the top of the whorl in the neanic and later stages. Between the upper spiral and the posterior basal cord, except in the youngest whorls, there is a pronounced concavity in which lie two secondary and one or more tertiary spiral threads. No protoconch was found; the nepionic whorls carry a prominent medial rib which develops into the posterior basal carina; also, a weak rib is present or suggested adjacent to the anterior suture and another one on the upper fourth of the whorls. In well preserved specimens, the whole surface of the shell is highly ornamented by numerous, strong, sub-microscopic, spiral lines, and crossed by prominent growth lines which cause transverse nodes or prominences on all the spiral cords; in the larger whorls, the strength of the nodes increases and the stronger carinae have a decidedly beaded appearance; the strong growth lines have only a moderate curve on the posterior portion of the whorls. The nepionic portion of the shell is smoother and less ornate. The suture is not conspicuous and is slightly overhung by the anterior basal carina; the carina is ornamented with conspicuous, spiral, sub-microscopic lines (which are less strong near



the suture) and crossed by forward swinging growth lines.

The ornamentation of this *Turritella* is somewhat similar to that of *T. zuliana* (n. sp.) and *T. gilbertharrisi* (n. sp.). This species is very easily distinguished from *T. zuliana* which has a wide, scalloped, basal keel, and from *T. gilbertharrisi* which has less concave whorls and a more aciculate spire. The two, strong, equal or subequal, basal cords easily distinguish this species from other Venezuelan *Turritellas*.

The holotype is a fragment of about  $5\frac{1}{2}$  whorls which measures about 3 mm. at the upper suture of the uppermost whorl and 3.7 mm. through the middle of it; maximum diameter of the largest whorl is about 8.8 mm.; the greatest length of the fragment is 22 mm.

Named in honor of Dr. B. Hubbard, Chief Geologist of the Standard Oil Company of Venezuela.

*Age:* Oligocene-Miocene.

*Locality:* Rather common in District of Buchivacoa. State of Falcón. Locality Numbers: 15, 16, 25, 1216, 1629, 1762 (*cf.*), 1943 (*cf.*), 2018, 2019, 2019A, 2040.

***Turritella hubbardi weeksi***, n. subsp. Pl. 8, fig. 7; Pl. 10, figs. 4, 5.

This subspecies differs in having a tendency to double the uppermost, primary, spiral cord; also, the posterior of the two basal carinæ becomes weaker in the adult whorls.

Named in honor of Mr. L. G. Weeks, Geologist for the Standard Oil Company of Venezuela, who helped collect the material.

*Age:* Oligocene-Miocene.

*Locality:* States of Zulia and Falcón. Locality Numbers. 2018, 3250.

***Turritella cauredalitoensis*** (emended from Williston's MS.)

Pl. 6, fig. 6; Pl. 9, figs. 2, 4; Pl. 10, fig. 2; Pl. 11, figs. 1, 3, 5.

Shell of medium size and taper; whorl lengths comparatively short; whorls concave in adult stages. Later ne-

pionic whorls are ornamented with three, strong, regularly spaced, subequal spirals; the anterior one is adjacent to the suture; the middle one is slightly stronger than the others, with a concave interspace on each side of it; the spiral ribs and interspaces even in these young whorls are ornamented with many, fine, microscopic, spiral lines and crossed by sub-microscopic, curved, growth lines which are retractive to the posterior interspace and then protractive to the suture; in all except the youngest whorls, one or two strong secondary spirals appear in the posterior concavity and several sub-microscopic spiral lines in the anterior concavity; the whorls rapidly become concave and the anterior rib forms a small keel which projects over the compressed and inconspicuous suture; at the points where the growth lines cross the spiral cords, beads or nodes are formed, but unless the specimens are well preserved, this superficial ornamentation of the spiral cords does not show; in the adult specimens, the posterior concavity of the nepionic stage has become medial and carries two or three secondary spirals; behind the posterior spiral rib on the adult whorls, there sometimes appear one or two weaker spirals; the keel is usually distinctly ornamented with fine, superficial, spiral threads and crossed transversely by elevated growth lines.

This species somewhat resembles *T. zuliana* (n. sp.) but does not have the scalloped, knobby keel of the latter. The widely concave whorls, the rather small size of this *Turritella*, the comparatively short whorl lengths easily distinguish it from *T. larensis* (n. sp.) and other Venezuelan forms.

*Age:* Oligocene.

*Locality:* District of Buchivacoa, State of Falcón. *Locality Numbers:* 1084, 1139, 1159, 1159A, 1159B, 1159C, 1159H, 1217, 1953 (one specimen).

*Turritella cauredalitoensis liddlei*, n. subsp. Pl. 9, fig. 3; Pl. 11, fig. 6.

This subspecies differs in the adult whorls in that the

base of the keel or flange is rounded and the edge of the keel turns up posteriorly, causing the whorl to be more concave. The entire shell carries many revolving spirals of varying strength.

Named in honor of Mr. R. A. Liddle, now Divisional Geologist with the Pure Oil Company.

*Age:* Oligocene.

*Locality:* District of Buchivacoa, State of Falcón. Locality Numbers: 1159K, 1987.

***Turritella cauredalitoensis dabajuroensis*, n. subsp.** Pl. 11, fig. 4.

This subspecies differs in having much larger and coarser primary spiral cords. It approaches some of the varieties of *T. larensis* (n. sp.) in the character of ribbing in the neanic stages, but the younger and older whorls are not confusable.

*Age:* Oligocene-Miocene.

*Locality:* District of Buchivacoa, State of Falcón. Locality Numbers: 1627 (?), 2027.

***Turritella cauredalitoensis filensis*, n. subsp.**

Pl. 11, fig. 2; Pl. 12, figs. 1, 3, 5.

This subspecies differs in having pagoda-like keels or extremely wide carinating flanges. The growth lines are prominent; the entire shell is ornamented with fine spiral threads. The concave whorls with extremely wide, pagoda-like, sharp keels make this a unique subspecies.

*Age:* Oligocene.

*Locality:* District of Buchivacoa, State of Falcón. Locality Numbers: 1217, 1979.

***Turritella gilbertharrisi*, n. sp.**

Pl. 12, figs. 2, 4, 6; Pl. 13, figs. 1-6; Pl. 14, figs. 1, 4, 7.

Shell slender, of moderate size; spire very much attenuated. Protoconch consists of  $1\frac{3}{4}$  convex smooth whorls, which continue into the nepionic stage; the first 4 nepionic whorls carry a single, sharp keel near the anterior third of the whorl; the total length of the 4 whorls is about 1.7 mm. Each of the succeeding 7 whorls has a strong spiral on the



upper quarter, with a posterior slope or bevel between it and the suture; in this stage, the keel of the earlier whorls becomes more nearly sub-medial with a concave interspace on each side of it; a slightly weaker spiral appears just above the suture at the base of the visible portion of these whorls; the posterior concave interspace begins to show one or more secondary spirals; the spirals even in this young stage have a tendency to be beaded at the intersection of the growth lines; the length of the 7 later nepionic whorls is slightly less than 8.5 mm., with a maximum diameter of about 2.8 mm. The neanic whorls continue with approximately the same taper; the posterior concave interspace of the nepionic whorls becomes the slightly concave medial portion of the later whorls, and usually carries two, beaded, subequal, secondary spirals, and finer, intervening, tertiary threads. In the later adult whorls, the sides are slightly concave between the two posterior cords and carry 2-4 secondary, and numerous tertiary, spiral threads; just behind the posterior cord, there sometimes appear one or two, fainter, spiral cords; the basal cord varies tremendously in strength in different specimens; usually it is low and weaker than the other two posterior, larger, primary spirals; all the larger cords and interspaces are ornamented with several, smaller, superimposed, finer spiral threads. The whole surface of the *Turritella*, in all stages except the very youngest, is covered with irregular, elevated, growth lines, which have a tendency to slightly offset the numerous, fine, microscopic or sub-microscopic, costal and intercostal threads and grooves which cover the whole surface of the whorl, including the spiral cords. The suture is compressed and inconspicuous; the close-set growth lines are strongly retractive from the posterior suture to the concave portion of the whorl, in which they curve forward and are protractive to the anterior spiral cord, which they cross at almost right angles.

This rather long, slender *Turritella* shows a wonderful

microscopic ornamentation.

The species is not likely to be confused with any of the others. It has much less prominent spirals than *T. hubbardi* (n. sp.) and is, also, much more aciculate or attenuate.

Named in honor of Professor G. D. Harris of Cornell University.

*Age:* Oligocene-Miocene.

*Locality:* Rather common in the States of Falcón and Zulia. Locality Numbers: 6, 741, 777 (*cf.*), 919, 1140, 1414, 1415, 1419 (*cf.*), 1901 (one specimen only), 1944A, 2019, 2023 (?).

*Turritella gilbertharrisi staufferi*, n. subsp. Pl. 15, figs. 6, 9.

This subspecies differs from the species only in that the middle rib, or second anterior spiral, is doubled and is formed by two, complementary, united, spiral cords. This is scarcely more than a variation but represents a geographical difference.

Named in honor of Dr. Stauffer of the Caribbean Petroleum Company.

*Age:* Oligocene-Miocene.

*Locality:* District of Miranda, State of Zulia. Locality Number: 6.

*Turritella gilbertharrisi aguavivensis*, n. subsp. Pl. 15, figs. 1, 8.

This subspecies differs in having an intervening riblet between the two, anterior, primary, spiral cords. This intervening rib sometimes attains enough strength to give the appearance of three instead of two anterior primary spirals.

*Age:* Oligocene-Miocene.

*Locality:* States of Falcón and Zulia. Locality Numbers: 6, 2019.

*Turritella gilbertharrisi falconensis* (Williston MS.)

Pl. 14, figs. 2, 6, 8; Pl. 15, figs. 3, 4, 5, 7; Pl. 28, fig. 5.

This subspecies is much larger and coarser in appearance

than the species and has larger spiral ribs. There are four, large, spiral cords instead of three in all except the younger stages; the various weaker spirals found between the two, posterior, primary cords in *T. gilbertharrisi* (n. sp.) have been replaced in this subspecies by a fairly strong spiral, which gives this *Turritella* the appearance of having four main spiral ribs; there is sometimes the suggestion of a fainter secondary spiral near the middle of the whorl. In the adult whorls, between the posterior cord and the suture, there are 1-3 weaker secondary threads (usually 2 in number). Well preserved fragments show the same kind of superficial ornamentation observed in *T. gilbertharrisi* (n. sp.), the beading being more accentuated in the larger specimens of the subspecies. The anterior spiral frequently projects over the suture as a weak keel.

*Age:* Miocene.

*Locality:* Common in the State of Falcón. Locality Numbers: 100, 101A, 104, 273, 339, 341, 342, 798 (*cf.*), 1066, 1067, 1127, 1265, 1398, 1436, 1704, 1810 (?), 1812, 1816, 1820 (poorly preserved), 1825, 1827, 1900, 1901 (also contains one specimen of *T. gilbertharrisi, sensu stricto*), 1903, 1928, 1931B, 1931C, 1932, 1934.

***Turritella montañitensis*, n. sp.** Pl. 14, fig. 3; Pl. 15, fig. 2; Pl. 16, figs. 4, 5, 6, 8, 10; Pl. 17, figs. 3, 7, 8, 10, 11.

Shell turreted, slender, with a knobby basal carina on larger whorls. Protoconch is missing; first nepionic whorls are convex with a sub-medial, V-shaped carina; they are smooth except for faint, microscopic, posterior and anterior, spiral cords, which can be seen very early in these whorls; the posterior spiral cord is located approximately on the upper fifth of the whorl; the anterior spiral cord lies immediately behind the suture; the cords are beaded by the intersecting, curved, growth lines. In the subsequent whorls, the anterior spiral forms a strong cord, and in the adult whorls becomes a prominent, basal, knobby carina; finer, intervening, spiral threads are found on all except the

youngest whorls; between the posterior primary and second anterior primary cord, there is a wide concave area with minor spiral lines which are usually beaded; the primary and secondary cords are beaded by the intersecting growth lines; the suture is moderately well exposed below the over-jutting knobby keel; the strong primary spirals, and especially the first anterior of these which forms the keel or carina, are ornamented with many, fine, revolving spirals crossed by prominent growth lines; on the sides of the whorl, the growth lines recede sharply to the middle of the concave area, then swing forward to the keel, and then retract on the base of the whorl, giving the incremental lines a sigmoid shape. The strength of the primary spirals is rather variable as well as the spacing between them. The keel is usually basal and sometimes droops anteriorly, more or less covering the suture. The scallops or knobs on the keel are more numerous but smaller than on *T. montañitensis olcottii* (n. subsp.); the knobs are more conspicuous on the base of the keel than on the posterior side of it, because they are prolonged as prominences, taking the direction of the growth lines to the suture, and giving the base a fluted appearance. The number of knobs on the keel varies, but as an average, there are about 16 knobs on a whorl 15 mm. in diameter. This species has longer whorl lengths than any of our other Venezuelan forms.

*Age:* Oligocene-Miocene.

*Locality:* District of Buchivacoa, State of Falcón. Locality Numbers: 25, 52, 56, 811 (*cf.*), 1114 (*cf.*), 1939, 1957, 1996, 2015A, 2031, 2050, 2052.

*Turritella montañitensis olcottii*, n. subsp.

Pl. 16, fig. 12;  
Pl. 20, fig. 9.

This subspecies is less slender than *T. montañitensis*, and is particularly characterized by having fewer but larger knobs on the keel. The number of knobs on the keel of a whorl varies somewhat in different specimens, but as a general average, there are about 10 knobs on a whorl 20 mm.



in diameter.

Named in honor of Mr. Perry Olcott of the Standard Oil Company of Venezuela.

*Age:* Oligocene-Miocene.

*Locality:* District of Buchivacoa, State of Falcón. Locality Numbers: 1639, 2050, 2051, 2052.

***Turritella montañitensis saladilloensis*, n. subsp.** Pl. 16, fig. 2.

This subspecies differs in having more concave whorls, in having the posterior, primary, spiral weaker, and in having the second, anterior, primary, spiral cord stronger, than in *T. montañitensis*, *sensu stricto*; also, the two anterior primaries tend to be closer together. The carina overhangs and tends to conceal the suture.

*Age:* Oligocene-Miocene.

*Locality:* District of Buchivacoa, State of Falcón. Locality Number: 1957.

***Turritella curamichatensis*, n. sp.** Pl. 16, figs. 1, 3, 7, 9, 11;  
Pl. 17, figs. 1, 3, 4-6, 9.

Shell medium sized with strong spirals and a deeply excavated suture. Early neanic whorls carry two, strong, subequal, sub-medial, spiral cords, the lower of which gradually becomes more prominent and forms the second anterior spiral of the adult whorls, while the upper one becomes gradually weaker, changing from a primary cord in the neanic and early ephebic stages to a strong secondary one in the lower part of the medial concavity of the later ephebic and gerontic stages; the posterior part of each whorl is beveled and slopes into the excavated suture; the anterior margin of the beveled area is limited by a strong spiral cord which is found in all stages except possibly the nepionic which is not represented in our collection; the beveled area usually carries one or two, beaded, spiral threads; the anterior spiral, just behind the suture, becomes stronger in the adult whorls and forms a basal keel which projects over the excavated suture; the later nepionic and earlier

neanic whorls are convex with concave interspaces between the spirals; in the adult whorls there is a wide, more or less concave, medial depression between the second anterior and the posterior primary spirals; this concavity is present in most specimens and carries two or more secondary and some tertiary threads; the whole surface of the shell is crossed by prominent growth lines which cause knobs or beads at their intersection with the spirals; the two, anterior, primary spirals are frequently covered with numerous, sub-microscopic, superimposed, fine threads with narrow intervening grooves; the crossing of these threads and growth lines gives a reticulate structure especially noticeable on the base of the first primary cord or basal flange; the growth lines are sigmoid in shape, being retractive on the upper part, protractive on the lower half of the visible portion of the whorls, and retractive on the base of the whorls; the knobby ornamentation of the ribs is emphasized by the protuberance of the growth lines over the primary spiral cords, particularly on the basal flange.

This species, when well preserved, shows somewhat the fancy, superficial ornamentation found on *T. hubbardi*, *T. gilbertharrisi* and other of our Venezuelan Turritellas; it is easily distinguished from these and other similar species by the deeply excavated suture. It differs from *T. larensis*, with somewhat similar ribbing, by being smaller in size, and having differently shaped whorls: in *T. larensis* the adult whorls are concave, do not have the excavated suture, and have a much wider keel.

The medial concavity is variable in this species and in a few cases, the sides of the whorls have become almost flat.

*Age:* Oligocene-Miocene.

*Locality:* Common in the State of Falcón. Locality Numbers: 15, 440 (*cf.*, poorly preserved), 760 (*cf.*), 775 (*cf.*), 776 (*cf.*), 919, 1070, 1143, 1408, 1414 (*cf.*), 1436, 1437, 1754, 1761 (one specimen), 1944A.

*Turritella gatunensis* Conrad *lavelana*, n. subsp.

Pl. 18, fig. 6;  
Pl. 19, fig. 7.

This subspecies is distinguished by slight but constant variations from *T. gatunensis* Conrad and *T. gatunensis caronensis* Mansfield. In all except the earliest whorls, this subspecies is distinguished from *gatunensis*, *sensu stricto*, by a stronger medial carina; the strong posterior spiral just behind it is closer and usually without the intervening spiral threads found in the species; in a few cases, we have found a very weak intervening thread; the proximity of the medial carina and the strong spiral just posterior to it gives a strong medial prominence, which causes the lower part of the whorl to be more nearly perpendicular to the base; behind the medial prominence there is a sharp uniform constriction to the suture; in front of the prominence there is a pronounced, depressed, spiral cingulation, limited anteriorly by a primary spiral which forms a shoulder overjutting the suture; this gives the *Turritella* a bicarinate appearance; the cingulation is ornamented with more numerous, smaller, subequal spirals than in the species. The visible portion of the base of the whorl usually carries one or two strong spirals with wide interspaces which sometimes carry a faint thread; the corresponding area in most of our adult specimens of *T. gatunensis* Conrad from Gatun shows three or more, more closely spaced spirals between the anterior suture and the anterior primary spiral; also, the upper fourth of the whorl tends to be slightly more concave than in our subspecies.

This subspecies is distinguished from *T. gatunensis caronensis* Mansfield<sup>1</sup> by the weak medial carina and the more uniformly convex whorls of the latter.

*Age:* Miocene.

*Locality:* Common in the State of Falcón. *Locality Numbers:* 67, 70A, 100 (?), 150A, 150B, 184, 185, 273, 298, 314 (?), 1033, 1067, 1078, 1265, 1901.

<sup>1</sup> W. C. Mansfield, Proc. U. S. Nat. Mus., Vol. 66, Art. 22, pp. 51-52, Plate 8, figs. 12-14, 1925.

**Turritella gatunensis** Conrad **willistoni**, n. subsp. Pl. 18, figs. 2-4, 8.

We have not yet found the nepionic stages of this form, but it seems to be a subspecies of *T. gatunensis* Conrad. The constriction at the top of the neanic whorls is narrower and consequently seems deeper; our subspecies is a smaller form and has fewer secondary and tertiary spiral threads; in some specimens the whorls become very roundly convex in the ephebic and gerontic stages with a rounded area between the sides and base of the whorl; in this case they approach *T. gatunensis caronensis* Mansfield (*l. c.*) in the general shape of the whorl but not in the character of the ribbing. Our subspecies has three or four strong primaries with fewer secondary and tertiary spirals than occur in either the species or any of the other subspecies. The primary spirals are stronger and the intervening threads weaker than in similar forms.

Named in honor of Mr. S. H. Williston of the Venezuelan Sun Company.

*Age:* Miocene.

*Locality:* Common in the State of Falcón. Locality Numbers: 80 (*cf.*), 93, 94, 97, 149A (?), 178, 184, 225A, 291, 303, 317 (*cf.*), 325, 1031, 1033, 1255, 1265, 1856, 1858 (*cf.*), 1866, 1900, 2054.

**Turritella gatunensis** Conrad **taratarana**, n. subsp. Pl. 18, figs. 5, 7.

This subspecies is a further development of the new subspecies, *lavelana*. It is characterized by gentle scallops on the primary spirals which gives a knobby or beaded appearance. The scallops or beads are elongated transversely, *i. e.*, in the direction of the spiral ribbing. All of the strong spirals may show the scalloped character, but it is more pronounced and sometimes found only on the first strong anterior spiral. The number of scallops on a spiral varies, but usually there are 16-18 on a whorl 7 mm. in diameter. The knobby character begins to appear early in the neanic whorls.

*Age:* Miocene.



*Locality:* Districts of Colina, Miranda, and Democracia, State of Falcón. *Locality Numbers:* 80, 93, 184, 185, 193, 291, 1033, 1231, 1255, 1507.

*Turritella berjadinensis*, n. sp.

Pl. 18, fig. 1; Pl. 19,  
figs. 1, 3, 4, 6.

Shell is of medium size; sides of the whorl are almost flat except for two spiral prominences or keels, the posterior of which is a strong, medial or sub-medial, spiral rib with wide, flat or very shallow, concave areas on each side of it; the other spiral prominence forms a basal swelling on the anterior portion of the whorl, just behind and overhanging the suture; this basal prominence is decorated with several spiral ribs of varying strength; the flat or concave areas behind each of the keels, also, are ornamented with spiral ribs and on the larger whorls have weaker spiral threads alternating with the stronger; the total number of spirals on the visible portion of the whorls varies in different individuals and in different stages of the same individual; for example, the smallest whorl of the type specimen has 18 visible spirals and the largest has about 30. In some specimens there is a fairly strong spiral developed in the anterior concave area just behind the basal prominence. The base of the adult whorls is ornamented with spiral ribbing similar to that on the sides of the whorls, but usually shows a greater number of weaker intervening spirals between the stronger. The growth lines are not very conspicuous; but, on weathered specimens, they are straight and retractive on the upper portion of the whorl; they swing to an axial direction on the lower part of the whorl and cross the base at approximate right angles to the spiral sculpture. The base of the whorls is flat or slightly convex. The inside of the shell has several strong liræ which leave spiral grooves on the casts. The upper part of the whorl is sometimes more or less constricted just in front of the posterior suture.

This is an extremely variable species which grades into its subspecies, which in turn merge into each other, and

sometimes approach *T. mimetes* Brown and Pilsbry<sup>1</sup> and similar forms which have been previously described from the Caribbean region.

*T. berjadinensis*, *sensu stricto*, most closely resembles *T. boweni* (n. sp.) but the latter is distinguished by the fewer, larger, more widely spaced spirals, which are more uniform in size on the upper half of the whorl. The whorls are shorter and flatter than in *T. mimetes* Brown and Pilsbry.

Age: Miocene.

Locality: Common in the State of Falcón. Locality Numbers: 24, 74A, 82, 90, 93, 150B, 270, 317, 830, 1000, 1078, 1111, 1115, 1231, 1232, 1447, 1630, 1757, 1855, 1856, 1858, 1861, 1892, 1911, 2036.

*Turritella berjadinensis colinensis*, n. subsp.

Pl. 18, fig. 9;  
Pl. 19, fig. 8.

This subspecies is characterized by the lack of carinating spiral threads. The whorls are almost flat and have the same spiral ribbing as the species but less accentuated.

This subspecies bears a close resemblance to *T. mimetes* Brown and Pilsbry (*loc. cit.*) in all stages, but the young whorls show it to be more closely related to *T. berjadinensis*. It is distinguished from *T. mimetes* by its shorter flatter whorls and finer spiral ribbing.

Age: Miocene.

Locality: Common in the State of Falcón. Locality Numbers: 71, 74 (variation), 79, 80, 82, 83A, 84, 85, 90, 93, 97, 100, 103, 118, 149A, 150A, 150B, 180, 184, 185, 187, 189, 193, 204, 206, 215, 229, 298, 299, 300, 307 (variation), 1007 (variation), 1033, 1043, 1064, 1255, 1335, 1507, 1552, 1901, 1928.

*Turritella berjadinensis warfieldi*, n. subsp.

Pl. 20, fig. 8;  
Pl. 21, fig. 6.

This subspecies differs from the species, *sensu stricto*, in that the medial portion of the whorl carries two, instead of

<sup>1</sup> Proc. Acad. Nat. Sciences of Philadelphia, 1911, p. 357, Pl. XXVII, fig. 1.

one, prominent spirals; also, the development of the second strong spiral on the posterior third or fourth of the whorl tends to make the upper part of the whorl more constricted than in the species. The development of a strong secondary spiral just behind the basal prominence is more common than in *T. berjadinensis*, *sensu stricto*.

The adult whorls approach *T. mimetes* Brown and Pilsbry (*loc. cit.*) in general appearance; the ribbing on the lower half of the whorl is, indeed, very similar, but on the upper part of the whorl, *T. mimetes* has three or more strong spirals, instead of two.

*T. mimetes* has longer adult whorls and the younger whorls are much more convex than in *T. berjadinensis warfieldi*.

Named in honor of Mr. Wm. Warfield, formerly with the Standard Oil Company of New Jersey.

*Age:* Miocene.

*Locality:* Common in the State of Falcón. Locality Numbers: 83B, 84, 88, 93, 96, 98, 118, 137, 150B, 152, 155, 169A (*cf.*), 178, 184, 185, 187, 193 (*cf.*), 206, 215, 225, 270, 307, 830, 1007, 1033, 1043, 1066, 1111 (*cf.*), 1232, 1335, 1447, 1449, 1450, 1509, 1552, 1757, 1870 (*cf.*), 1892, 1905.

***Turritella berjadinensis socorroensis* (Williston MS.)**

Pl. 21, fig. 3; Pl. 23, fig. 8; Pl. 27, fig. 2.

This subspecies is a further development in the direction taken by the new subspecies, *T. berjadinensis warfieldi*. It tends to be a larger, heavier variety, having three, strong, spiral cords and a fourth weaker spiral between the two anterior primaries. There is a pronounced constriction around the upper fourth of the whorl in front of the posterior suture. The spiral ornamentation of the base is poorly preserved. This subspecies is retained because it marks the limit in the variation of this stock of *Turritella* toward a large, heavy, strongly ribbed shell.

*Age:* Miocene.

*Locality:* Principally in the Districts of Democracia and

Miranda, State of Falcón. Locality Numbers: 100, 103 (*cf.*), 104 (variation), 122B (*cf.*), 149A, 149B, 169A, 171, 172, 174, 270 (*cf.*), 301, 314, 325, 1017, 1127, 1931, 1932, 1934 (*cf.*).

***Turritella berjadinensis cocoditana***, n. subsp. Pl. 19, fig. 5; Pl. 20, figs. 3, 7, 10.

This subspecies is distinguished by having the upper half of the whorl much more constricted and by having a wider basal flange just behind the suture. The whole surface of the shell, when well preserved, bears more numerous and finer intervening spiral threads. The young stages show nodes on the upper half of the whorls elongated in the direction of the growth lines. The base bears about eight equally spaced spiral "welts" with three or more smaller intervening threads.

*Age*: Miocene.

*Locality*: District of Falcón, State of Falcón. Locality Number: 2207.

***Turritella planigyrate*** Guppy Pl. 19, figs. 2, 9.

*Turritella planigyrate* Guppy, Sci. Assoc. Trinidad Proc., Vol. 1, Pt. 3, pp. 169-170, 1867.

*Turritella planigyrate* Guppy, Geol. Mag., London, Vol. 1, N. S., p. 408, pl. 18, fig. 5, 1874.

*Turritella planigyrate* Guppy, Quart. Journ. Geol. Soc., London, Vol. 32, p. 519, 1876.

*Turritella planigyrate* Guppy, Agr. Soc. Trinidad and Tobago (Society Paper No. 440) p. 11, 1910.

*Turritella planigyrate* Guppy, Agr. Soc. Trinidad and Tobago, Society Paper No. 444), Vol. 10, p. 451, 1910. (*vide* Mansfield).

Not *Turritella planigyrate* Guppy, Maury, Bull. Amer. Pal., Vol. 5, pp. 293-294, pl. 48, fig. 14, 1917.

*Turritella planigyrate* Guppy, Maury, Bull. Amer. Pal., Vol. 10, p. 232, pl. 42, figs. 6, 7, 8, 1925.

*Turritella planigyrate* Guppy, Mansfield, Proc. U. S. Nat. Mus., 1925, No. 2559, Vol. 66, Art. 22, pp. 55-57, pl. 9, figs. 1, 9.

We have a single, small, young specimen of this species. It shows a slight variation in the early neanic whorls in developing slightly stronger spirals than are found in the corresponding whorls of our specimens from Trinidad. It is the only Venezuelan specimen which we can refer unquestionably to *T. planigyrate* Guppy.



Age: Miocene.

Locality: State of Delta Amacuro, Eastern Venezuela.

Locality Number: 1131.

*Turritella mauryæ*, n. sp.

Pl. 23, fig. 11.

*Turritella planigyrate* Guppy, Maury, Bull. Amer. Pal., Vol. 5, 1917,  
pp. 293-294, Pl. 48, fig. 14.

Shell rather small, turreted; spirals scalloped or beaded. Protoconch consists of about  $1\frac{3}{4}$  smooth convex whorls; the first 3 nepionic whorls are convex with a medial carinating spiral; in front of the carina, there are about three equally spaced primary spirals with intervening spiral threads; between the medial carina and the posterior suture there are about three primaries, the middle one of which is stronger than any of the other spirals on the whorl except the medial carina; between the primaries, there are intervening, weaker, spiral threads. The number of spirals increases on the succeeding whorls, and all of them, especially the primary ones, become scalloped or knobby; the number of scallops varies, but on the last whorl (8.5 mm. in diameter) there are about 17 or 18 small scallops. On the larger whorls, there are three about equally spaced spirals which are stronger than the others; between these, there are intervening, secondary spirals, with still weaker tertiary threads; on the posterior slope, there are three or four less prominent spirals. The sides of the larger whorls are moderately convex; the base is almost flat and is spirally striate with 2-5 weaker spirals between the stronger ones. The growth lines are not conspicuous. The inside of the shell is reinforced by about eight spiral liræ of varying strength.

Attention was drawn to this species in the synonymy given by Mansfield<sup>1</sup> for *T. planigyrate* Guppy.

The finely scalloped spirals easily distinguish this species from *T. planigyrate* Guppy from Trinidad.

Named in honor of Dr. C. J. Maury.

<sup>1</sup> W. C. Mansfield: Proc. U. S. Nat. Mus., Vol. 66, 1925, Article 22, p. 256.

*Age:* Miocene.

*Locality:* Bluff 2, Cercado de Mao, Santo Domingo. Collected by Dr. Maury, expedition of 1916.

***Turritella variegata* Linné *paraguanensis*, n. subsp.** Pl. 21, figs. 2, 7.

This subspecies is very close to *T. variegata* Linné which is so common in the recent faunas along the north coast of Venezuela. It differs in having stronger ribbing, especially on the base of the whorls, which are corrugated with about six very prominent ridges; the corrugations and interspaces are overridden with numerous, finer, spiral threads. This subspecies increases in size more rapidly than the recent species shown in Pl. 22, fig. 7.

*Age:* Quaternary.

*Locality:* District of Falcón, State of Falcón. Locality Number: 1504.

***Turritella plebeia* Say *A-L-Owensi*, n. subsp.** Pl. 20, figs. 1, 2, 5, 6;  
Pl. 23, fig. 2; Pl. 28, fig. 1.

This subspecies differs principally in attaining a much greater size; the larger whorls are less convex; the posterior slope is much longer and less inclined. The spirals become more nearly equal in size, the channeled interspaces being as wide or wider than the spirals. The base of the whorls is somewhat flattened and ornamented with many fine spirals. *T. plebeia* Say from Jones Wharf, Maryland, is figured for comparison, Pl. 21, fig. 5.

Named in honor of Mr. A. L. Owens, Geologist for the Standard Oil Company of Venezuela.

*Age:* Miocene.

*Locality:* Districts of Colina and Democracia, State of Falcón. Locality Numbers: 71, 84, 90, 96, 150A-B, 150B, 171 (?), 193 (and variations), 225A, 298.

***Turritella matarucana*, n. sp. \*** Pl. 20, fig. 4; Pl. 21, figs. 1, 9.

Shell turreted, with long flattened whorls, ornamented with many spirals. Protoconch and nepionic whorls are missing. Neanic whorls are roundly convex; the posterior

slope is more gentle than the anterior; whorls are ornamented with about twelve flattened spiral ribs of varying strength, wider than the interspaces. The succeeding whorls become less convex and almost flat-sided except for the rounded posterior and anterior slopes. In the large adult whorls the number of spirals increases due to the interpolation of intervening spirals, or the width of the spirals increases, or both may occur on the same whorl; that is, some of the flat spirals become uniformly wider on the succeeding whorls, or narrower, intervening, secondary spirals may appear, or the ribs may become wider with only a few intervening weaker spirals; the proportion of the wide ribs to the narrow is not at all constant, but in well preserved specimens all of the ribs are flat, and they are wider than the groove-like interspaces; in the adult whorls the number of ribs varies from 15-22 depending on their width. The growth lines are decidedly curved on the visible portion of the whorls, but we have not seen the sculpture on the base. The suture is excavated.

The wide spirals with narrow interspaces on almost flat-sided whorls make this a distinctive species.

*Age:* Miocene.

*Locality:* Districts of Colina and Democracia, State of Falcón. Locality Numbers: 71, 194A, 197, 199, 1027, 1250.

***Turritella venezuelana*, n. sp.** Pl. 21, figs. 4, 8; Pl. 22, figs. 1, 6.

Shell is small, turreted, and rather slender. Protoconch consists of  $1\frac{3}{4}$  small round whorls. Nuclear whorls are continuous with the nepionic whorls which are sub-medially bicarinate, with a slightly convex, long, posterior slope; anterior slope, short, steep, and slightly concave; the second nepionic whorl shows a trace of a microscopic spiral on the anterior third of the posterior slope; the later nepionic whorls develop another spiral thread on the upper third of the posterior slope; the spiral ribs are sharply elevated; the

interspaces are wide and concave. The neanic and succeeding whorls of this abundant species begin to show many variations in the shape of the whorl, and in the character and spacing of the spirals. The commonest form has a rather flat tapering whorl with an overjutting beveled base sloping down sharply to the suture; the second anterior primary spiral forms the apex of the angle between the long, tapering, posterior part of the whorl and the narrow, steep, anterior slope leading down to the suture; the long posterior part of the whorl carries four elevated spirals with wide concave interspaces; the interspace between the 2 large posterior primaries is usually wider than the others; just in front of the suture on the posterior slope, there are one or two secondary spiral threads; about the middle of the steep anterior slope there is a fairly strong spiral. The surface of the shell is usually covered with a shiny enamel. The growth lines are very inconspicuous, but are slightly retractive on the sides and base of the whorl. The base is flattened and ornamented with numerous fine spirals.

There are innumerable variations in this species. The shape of the adult whorls varies tremendously, even in the same individual. The larger whorls frequently become roundly convex instead of being angulated behind the anterior slope. In some specimens, secondary threads appear in some of the wide interspaces, and other threads near the sutures.

This small form somewhat resembles the much larger species, *T. subgrundifera* Dall<sup>1</sup> from the Chipola beds, which has its nuclear whorls oblique to the axis of the shell.

The inside of the shell gives very faint traces of internal liræ.

*Age:* Oligocene-Miocene.

*Locality:* District of Miranda, State of Zulia. Locality Numbers: 6, 810 (?), 811, 814, 815, 822, 1628, 1754 (*cf.*),

<sup>1</sup> Wm. H. Dall: Trans. Wagner Free Inst. of Science, Vol. III, Part 2, 1892, pp. 313-14, Pl. 22, fig. 23.



1761, 1942, 1955, 2010, 2019, 2019A, 2021, 2022, 2023, 2027.

***Turritella venezuelana quirosana*, n. subsp.** Pl. 22; figs. 9, 10;  
Pl. 24, fig. 1.

This subspecies is characterized by the tendency to interpolate an intervening secondary spiral thread between the primaries. The whorls vary tremendously in convexity; the moderately flattened, convex, tapering, adult whorls, are more common than the very roundly convex ones; the secondary threads may appear between most or all of the primary spirals. Fig. 1 on Pl. 24 shows a freak in which intervening secondary spirals suddenly appear after an injury to the shell.

*Age*: Oligocene-Miocene.

*Locality*: States of Falcón, Lara, and Zulia. *Locality Numbers*: 6, 814, 815, 822, 2019, 2022, 2027.

***Turritella venezuelana watkinsi*, n. subsp.** Pl. 22, fig. 8.

This subspecies represents a common variation toward roundly convex whorls without intervening secondary threads between the primaries. Adult whorls become less convex than the younger but do not show intervening spirals.

Named in honor of Mr. W. A. Watkins, formerly of Cornell University, who helped collect some of this material.

*Age*: Oligocene-Miocene.

*Locality*: District of Miranda, State of Zulia. *Locality Number*: 6.

***Turritella G-A-Weaveri*, n. sp.** Pl. 22, figs. 3, 5; Pl. 23,  
fig. 9; Pl. 24, fig. 4.

Shell rather small, slender, with convex whorls in young stages, and somewhat flattened whorls in adult stages. Protoconch and first nepionic whorls are missing; succeeding nepionic whorls have a medial carina with the anterior and posterior slopes about equal in length and steepness; posterior slope carries 2 (and later 3) about equally spaced spiral threads; anterior slope carries 3 (and later 4) spirals

of which the middle one soon becomes stronger than the others and approaches the strength of the medial carina. The convex neanic stages are bicarinate, one keel being medial and the other weaker one half way between it and the anterior suture; secondary spirals appear between the primaries; typically, the intervening thread just behind the medial keel is very faint or lacking. The spiral sculpture of the neanic whorls resembles that mentioned in the nepionic stage with additional threads of varying strength appearing on the upper half of the whorl. The succeeding whorls become less convex with flattened sides, and bear 7 or 8 subequally spaced strong spirals, some of which are larger than others. The base of the whorl, ornamented with several revolving lines, is rather flat and projects over the succeeding whorl. Growth lines are inconspicuous. Largest whorl found measures 10 mm. in diameter.

This *Turritella* most closely resembles some of the flat-sided adult whorls of *T. venezuelana* (n. sp.). It is easily distinguished by the single medial carina of the nepionic whorls in place of the double of the latter species.

Named in honor of Mr. G. A. Weaver who was an invaluable collaborator in the field work during 1924-5.

*Age:* Oligocene-Miocene.

*Locality:* District of Buchivacoa, State of Falcón. Locality Numbers: 47, 51, 52, 2010.

***Turritella cornellana*, n. sp.** Pl. 22, figs. 2, 4; Pl. 24, figs. 11, 14.

Shell is very slender, ornamented with many spirals of varying strength; shape of whorl and prominence of ribbing are very variable. Protoconch and earliest whorls are missing. Later nepionic whorls are convex and medially carinate; posterior slope is flat or convex and ornamented with several spiral striæ of varying strength; anterior slope, flat or concave with spiral ornamentation similar to that on the posterior slope. On the neanic and succeeding whorls the sides become almost flat and carry four about equally spaced primaries with two or more intervening secondary

threads; anterior slope is shorter and steeper than the posterior; both slopes carry a spiral ornamentation similar to that on the sides; the suture is excavated; in the adult whorls, the overjutting base eliminates an anterior slope; the base of the whorl is flattened and seems to have a spiral sculpture similar to that on the sides of the whorl. The growth lines are retractive on the upper half of the whorl and take an axial direction over the lower half; prominent beads or nodes are formed on the upper half of the whorl at the intersection of the spirals and the growth lines; depressions in the spirals and interspaces are sometimes noted on either side of the elevated growth lines which cause the nodes.

*Age:* Oligocene-Miocene.

*Locality:* District of Miranda, State of Zulia. *Locality Number:* 3222.

***Turritella cornellana bolivarensis*, n. subsp.** Pl. 24, figs. 2, 3, 13.

This subspecies is less slender, more strongly ribbed, and has a more pronounced overjutting shoulder at the base of the whorl. The posterior slope is slightly concave in the adult whorls; all the spirals may be strongly beaded in this subspecies.

*Age:* Oligocene-Miocene.

*Locality:* District of Miranda, State of Zulia. *Locality Number:* 3222.

***Turritella boweni*, n. sp.** Pl. 24, figs. 5, 6, 10; Pl. 25, fig. 3.

Shell small, bicarinate except in the younger stages; adult whorls almost flat with about 5 equally spaced primaries on the upper half of the whorl. Protoconch and early nepionic stages are missing. Later nepionic whorls are submedially carinate; the posterior slope is longer and more gentle than the anterior; both are ornamented with a few spirals. Neanic whorls are convex and bicarinate; the anterior carina is less prominent and located just behind the anterior suture; there is a wide concave interspace between the 2 carinae, which usually shows a secondary intervening

thread; posterior slope is almost flat and carries 4 equally spaced, elevated, primary spirals behind the medial carina. Succeeding whorls have about the same sculpture as the neanic, but are less convex and become nearly flat-sided; the bicarinating spirals of the earlier whorls are not so prominent in the adult stages, and form the 2 anterior primary spirals with a wide flat interspace between them; this interspace usually carries one intervening secondary spiral; between the anterior primary and a secondary thread that lies near the anterior suture, there is a narrow, beveled or slightly concave, steep, anterior slope with a faint spiral near its middle. The growth lines are seldom seen, but are slightly retractive on the visible portion of the whorl. The sculpture on the base of the whorl has not been seen.

This species somewhat resembles *T. venezuelana* (n. sp.) and *T. berjadinensis* (n. sp.); it is distinguished from the former by the wide flat interspace between the 2 anterior primaries of the adult whorls; from the latter, by the absence of the numerous, intervening, secondary threads and by the fewer spirals in the adult.

Named in honor of Mr. C. F. Bowen, Chief Geologist of the Standard Oil Company of New Jersey.

*Age:* Oligocene-Miocene.

*Locality:* Districts of Buchivacoa and Acosta, State of Falcón. Locality Numbers: 725, 1217.

**Turritella andreasi** (Williston MS.) Pl. 24, figs. 7-9, 12; Pl. 25, fig. 2.

Shell is of moderate size with convex whorls. Protoconch and nepionic whorls were not found; earliest whorls preserved have a diameter of about 2.3 mm.; they are convex, ornamented with about seven primary and secondary spirals with some weaker microscopic intervening threads; the anterior slope is slightly steeper than the posterior and carries several fine spiral threads. The adult whorls are almost uniformly moderately convex, with 9-11, subequally spaced, primary spiral cords of varying strength; there are usually one or two intervening threads between



the spirals on the lower half of the whorl; in some specimens an intervening thread is found between some of the spirals on the upper part of the whorl; the primaries tend to be somewhat more closely spaced on the posterior than on the anterior slope; the anterior slope always carries at least one primary spiral about midway between the anterior suture and the first anterior primary on the sides of the whorl; the wider interspaces frequently carry two or more intervening, sub-microscopic, spiral threads. The growth lines are sickle-shaped, being strongly curved on the upper half of the whorl and crossing the lower half and base of the whorl more or less at right angles to the spiral ribbing. Sutural line is rather inconspicuous. In the intermediate stages it is sometimes difficult to tell this species from *T. filacarmenensis* (n. sp.) but the young and adult stages are easily distinguished; in the young stages, *T. filacarmenensis* is much more convex and has stronger, fewer, primary spirals; in the adult whorls, *T. filacarmenensis* has a pronounced excavated anterior slope without prominent spiral ribbing.

Named in honor of Mr. A. Andreas, Jr., Geologist for the Standard Oil Company of Venezuela.

*Age:* Oligocene.

*Locality:* Common in the State of Falcón. Locality Numbers: 31, 32, 40, 66, 508 (and variation), 802, 1048, 1058, 1061, 1084, 1130 (?), 1135 (variation), 1139, 1159, 1159B, 1217, 1638 (variation), 1664 (and variation), 1664B (variation), 1951 (variation), 1953, 1963, 1964, 1987.

*Turritella filacarmenensis*, n. sp.

Pl. 23, figs. 1, 5; Pl. 25, figs. 4, 6, 10, 12.

This *Turritella* closely resembles *T. andreasi* (Williston MS.) in the intermediate whorls, but is very different, especially in the younger stages. Protoconch is missing: nepionic whorls are sub-medially bicarinate, with a long gentle posterior slope carrying a faint spiral, which later forms a third primary spiral on the upper part of the

neanic whorls; in the later neanic whorls there are four, about equally spaced, strong, primary spirals with an intervening sub-microscopic spiral thread in the interspaces; some weak secondary spirals appear on the posterior slope and the deeply concave anterior area carries very faint spiral threads. The number of primaries increases in the adult stages and the whorls become more gently convex. In the larger whorls there are about 9 primaries of varying strength and many weaker intervening threads; the visible portion of the base of the whorl forms a concave, narrow, anterior slope which does not carry any prominent spiral ribbing and is limited anteriorly by a faint spiral just behind the inconspicuous suture; this spiral forms a sharp shoulder between the flat concealed base of the whorl and the sides. The sculpture on the base of the whorls is not well preserved but has spiral ribbing more or less like that on the sides of the whorl. The growth lines are not conspicuous, but on our weathered fragments they seem to resemble the incremental lines of *T. andreasi* (Williston MS.).

It is distinguished from *T. andreasi* (Williston MS.) which it most closely resembles, by the absence of any strong spiral ribbing in the anterior concave area in the adult stages and by the fewer and stronger spirals in the younger stages.

*Age:* Oligocene.

*Locality:* District of Buchivacoa, State of Falcón. Locality Numbers: 1953, 1964, 1987, 2000.

***Turritella buchivacoana*, n. sp.** Pl. 23, fig. 7; Pl. 25, figs. 7-9.

Shell is small; whorls are ornamented with crowded minute spirals and 3 strong primary spirals,— the first of which forms the basal carina, the other two are on the convex portion of the whorl. Protoconch consists of about 2 smooth round whorls, continuous with the succeeding stages. Nepionic whorls are medially carinate, with a pos-

terior spiral appearing on the middle of the posterior slope and an anterior spiral at the base of the visible portion of the whorl just behind the suture; the whole surface of these and succeeding whorls is covered with minute or microscopic spirals of varying strength. In weathered specimens a deep groove frequently is seen at the posterior base of the anterior spiral. The neanic and succeeding adult whorls change in shape due to the development of a sharp basal carina which juts over the sutural line at the base of the whorl; the sides of the whorls are slightly convex with two primary spirals occurring near the medial line; the interspaces between the spirals are concave; the area between the posterior primary spiral and the posterior suture is somewhat concave and about equal in width to the anterior concave interspace between the middle and basal primary spirals; the medial concavity is slightly narrower than the others; a strong secondary spiral is sometimes developed in the anterior concavity. Weathered specimens often seem to have four primaries, instead of three (with a strong secondary in the anterior interspace); the sutures frequently appear deeply excavated in weathered specimens.

This species does not closely resemble any of the others. It bears a superficial resemblance to *T. gatunensis* Conrad, but the numerous fine spirals easily distinguish it, as does the sharper basal flange.

*Age:* Oligocene-Miocene.

*Locality:* Common in the State of Falcón. Locality Numbers: 257, 400, 1042, 1070, 1282, 1408, 1627, 1628, 1629, 1722, 1761, 1935 (*cf.*), 1936, 1942, 1955, 2018, 2019, 2019A, 2022, 2023, 2027, 2031.

***Turritella buchivacoana cañonensis*, n. subsp.** Pl. 25, figs. 1, 5.

This subspecies differs in having less prominent microscopic spiral striation, in having a less pronounced basal keel and in having a less deeply excavated suture. The diminutive basal keel is the most characteristic and distinctive feature. The sides are somewhat more convex

than in *T. buchivacoana*, *sensu stricto*.

Age: Miocene.

Locality: District of Miranda, State of Falcón. Locality Numbers: 341, 1630, 1792.

*Turritella elmenensis*, n. sp.

Pl. 25, fig. 11.

Whorls finely striate; the strong spiral on the anterior third of the whorls gently scalloped; apical angle large; protoconch and earliest whorls missing. Smallest whorl on the holotype is 2 mm. in diameter; it carries a strong, sub-medial, carinating spiral, with a concave interspace on each side; the posterior of these interspaces is wider than the anterior and is limited by a spiral on the posterior fourth of the whorl; the anterior concave interspace is limited by a spiral which is adjacent to the sutural line. The posterior slope is steeper in the young stages. In the succeeding whorls the medial carina increases in relative strength; it moves forward to the anterior fourth of the larger whorls where it becomes gently scalloped; the posterior primary remains on the posterior fourth of the whorls and the anterior one remains just behind the suture. The whole surface of the *Turritella*, including the primaries, is covered with minute spirals of varying strength; there are about 50 of these minute spirals on a whorl 9 mm. in diameter.

In the largest whorls, some of the minute spirals have become relatively stronger than the others, and might be termed secondary spirals. The base of the whorl is slightly concave and ornamented with numerous, fine, revolving lines.

The abundant, fine, spiral striation and the gently scalloped sub-medial keel make this a unique species.

Collected by the Miranda Exploration Company. Only one specimen has been found.

Age: Oligocene-Miocene.

Locality: Near Quirós, District of Miranda, State of



## Zulia.

**Turritella guppyi** Cossmann **morantensis**, n. subsp. Pl. 26, figs. 3, 5, 6, 8; Pl. 28, fig. 4.

Protoconch consists of  $1\frac{1}{2}$  smooth convex whorls, followed by two mono-carinate nepionic whorls in which the carina is located on the anterior third of the whorl; the posterior slope is longer and more gentle than the anterior; length of the first eleven whorls, 7.7 mm.; all the succeeding whorls are bicarinate with single, beaded ribs; the upper half of the wide medial concavity carries three or four spirals of varying strength; the lower half of the concavity seldom shows any prominent spiral ornamentation. The posterior slope carries a secondary spiral thread about midway between the upper cord and the posterior suture. The shell is thin, and rather attenuate; the growth lines are not very prominent, but are retractive to the middle of the whorl and protractive on the lower half; the beads on the spiral ribs and threads are at the points where the growth lines cross them and are elongated in the direction of the growth lines. Well preserved specimens show minute spirals over the whole surface of the shell including the tops of the spiral carinæ.

This subspecies seems to differ very little from the cast and photograph (Pl. 27, fig. 1) which Dr. R. S. Bassler of the U. S. National Museum very kindly made for us of the type of *T. guppyi* Cossmann<sup>1</sup> (equals *T. tornata* Guppy) from Cumaná, Venezuela. It may be that they are identical but we believe it advisable to consider this Bowden form as a subspecies until better material is collected from Cumaná.

The distinctive characters are very slight, but the posterior slope in *T. guppyi* is more gentle and is not as concave as in the subspecies *morantensis*. The shell of the subspecies seems to be more delicate and attenuate than suggested by the cast of the type of *T. guppyi*.

<sup>1</sup> M. Cossmann: Revue Critique de Paléozoologie, 1909, p. 225.

*Age:* Miocene.

*Locality:* Bowden, near Bowden Wharf, Morant Bay, Jamaica. *Locality Number:* 1109.

*Turritella carlottæ*, n. sp.

Pl. 26, fig. 2; Pl. 27, fig. 11.

*Turritella tornata* Guppy, Maury, Bull. Amer. Pal., 1917, Vol. 5, p. 294, Pl. 48, fig. 15.

Shell is thin, turreted, rather small, with two spiral carinating prominences. Protoconch is missing; first two nepionic whorls, smooth, very convex due to a strong angulated carina on the basal third of the whorls; on each side of the carinating ridge, there is a slope to the sutures; the posterior slope is much more gentle than the anterior; the two succeeding nepionic whorls are not angulated but are roundly convex with a strong spiral on the basal third, and with two or three fainter intervening ones distributed between it and the posterior suture; all the succeeding whorls carry a medial, concave, spiral depression with a prominence on each side of it; the anterior prominence is a single, spiral, carinating rib near the anterior third of the whorls; it is higher and sharper than the posterior prominence which is a wide, rounded ridge occupying most of the upper half of the whorl and surmounted by two separate beaded spirals of about equal strength; near the middle of the medial concave area, there are two or three secondary spirals; between the lower cord and the anterior suture there is a concave area. The whole shell carries microscopic spiral ribbing, which is especially noticeable in the anterior concave area and on the posterior slope. In the larger whorls, there is a spiral formed at the base of the anterior concave area, just behind the anterior suture. The growth lines are inconspicuous.

This *Turritella* is distinguished from *T. attilira* Conrad by having a greater apical angle and by having a lower, wider, rounded, posterior, carinating prominence surmounted by two weak spirals. It is distinguished from *T. guppyi* Cossmann and its new subspecies *morantensis* by

carrying two equal spirals on the rounded upper prominence, instead of one strong spiral with a weaker one on the posterior slope. It further differs from *T. guppyi* Cossmann *morantensis* (n. subsp.) in having a greater apical angle.

Named in honor of Dr. C. J. Maury.

Age: Miocene.

Locality: Río Gurabo at Los Quemados, Santo Domingo. Specimens collected by Dr. Maury, expedition of 1916.

***Turritella altilira* Conrad *urumacoensis*, n. subsp.** Pl. 26, figs. 4, 7;  
Pl. 27, figs. 3, 7, 10.

This abundant *Turritella* differs so much from our adult specimens of *T. altilira* Conrad collected from Gatun, C. Z., that we were inclined at first to make it a new species. Unfortunately, these long slender forms are seldom preserved except as fragments. We did not find the protoconch or the earlier nepionic whorls of the Venezuelan form, but the later nepionic whorls agree so closely with some of the Gatun specimens that we are considering this as a subspecies of *T. altilira* Conrad until the young stages are found to establish its relationship with certainty. The adult whorls show a closer similarity to *T. guppyi* Cossmann or its new subspecies *morantensis* than to *T. altilira* Conrad, but it is distinct from each of them.

The greatest diameter of the smallest well preserved whorl in our collection is about 3.7 mm.; the posterior spiral rib has an auxiliary spiral about the middle of its lower side and this tends to make it somewhat larger than the anterior keel in the young stages; there is a secondary spiral in the center of the concave area in the middle of the whorl; near the posterior base of the anterior spiral there is another secondary spiral; in addition to the two primary carinating ribs, there are three secondary spirals with fainter intervening threads in the medial concave area; sub-microscopic spirals are to be found over the entire surface of the whorl in well preserved specimens; the later nepionic

whorls bear a close resemblance to the corresponding stages of *T. altilira* Conrad, *sensu stricto*. For comparison we are figuring specimens of *T. altilira* from Gatun, C. Z. (Loc. No. 1101) in Pl. 26, fig. 1; Pl. 28, fig. 3; Pl. 29, fig. 1.

The neanic and ephebic stages of the subspecies do not show a very close similarity to the species because in the former the two carinating spirals are always single; the posterior cord does not show any tendency to become double or to be strengthened by a strong auxiliary cord on its lower side; the two large spiral keels are about equal in size, but the anterior one tends to be slightly smaller. The medial concavity is slightly wider because the upper rib is narrower than in *T. altilira* Conrad; three or four weaker secondary spirals are found in the middle of this concavity and on the lower part of the posterior keel; the upper side of the anterior keel does not seem to bear any prominent spiral ornamentation.

It differs from *T. guppyi* Cossmann in having a larger and heavier shell, in being more strongly beaded, and in lacking the spiral thread on the posterior slope. It is like *T. guppyi* in having two single keels.

Age: Miocene.

Locality: Common in the State of Falcón. Locality Numbers: 78, 79, 83, 84, 90, 93, 96, 118, 120A, 120B, 121, 122A, 122B, 123, 127, 129, 130, 131, 138, 150, 150A, 154, 159(?), 162, 163, 176, 178, 180, 189, 204, 205A, 206, 206A, 219A, 220, 222, 261, 290, 295, 297, 325, 354, 719(?), 1004, 1007(?), 1012, 1034, 1067, 1233, 1322, 1447, 1450, 1852, 1856, 1858, 1863 (*cf.*), 1870, 1892, 1908.

*Turritella altilira* Conrad *mirandana*, n. subsp. Pl. 23, fig. 10;  
Pl. 28, fig. 2.

This subspecies stands very close to *T. altilira* Conrad, *sensu stricto*, and to its variety *chiriquiensis* Olsson,<sup>1</sup> but there is a slight difference which is constant in the Venezuelan forms, *viz.*, the components of the double upper

<sup>1</sup> A. A. Olsson, Bull. Amer. Pal., Vol. 9, pp. 322-323, Pl. 17, fig. 4, 1922.



spiral rib are almost equal, or the weaker supplementary cord is posterior to or above the larger anterior one. In all of our specimens from Gatun, C. Z., the upper rib, if double, has the weaker cord below, or just anterior to the larger posterior cord. The two main cords forming the strong posterior rib vary in strength; frequently, the two cords attain an almost equal size but in no case does the posterior component become stronger than the lower component, as is the general case in typical *T. altilira* Conrad.

This subspecies differs from variety *chiriquiensis* Olsson in that the upper carinating rib is double; in variety *chiriquiensis*, it is single; in the latter, there occurs on the posterior slope a weaker spiral thread which is not a supplementary cord of the upper keel. The posterior slope is much steeper than in variety *chiriquiensis* due to the greater width of the upper double keel.

*Age:* Miocene.

*Locality:* Common in the States of Falcón and Zulia, Venezuela, and at Cartagena, Columbia. Locality Numbers: 103 (?), 122B, 149, 154, 171 or 172 (variation), 178 (variation), 179, 277, 304, 1004, 1031 (?), 1100, 1799 (*cf.*), 1800, 1802, 1805, 1859 (*cf.*), 1860 (?), 1901, 1905, 1931B, 1931C, 1934, 3222.

*Turritella vistana*, n. sp.      Pl. 23, figs. 3, 4; Pl. 27, figs. 8, 9, 12;  
Pl. 28, fig. 4.

Shell is turreted, bicarinate, attenuate. Protoconch and early nepionic whorls are missing. Later nepionic whorls are bicarinate; upper spiral rib is weaker than the lower; the concave interspace between the keels is ornamented with about three secondary spirals; all the spirals are beaded in well preserved specimens. In the neanic stages, the two single keels are almost equal in size, and later, the posterior finally becomes the larger of the two. In the succeeding whorls, the keels are always single, very pronounced in transverse height, rather narrow in axial width, with deep, narrow, concave interspaces; when the keels are much ex-

tended, they are frequently concave on either side, but more so on the sides facing the sutures; the deeply excavated area between the keels usually is ornamented with about three beaded secondary spirals and occasionally finer spiral threads; one of the spirals usually lies on the lower side of the upper rib; the sigmoid growth lines cause heavy beads or oblique nodes elongated in the direction of the lines of growth over the keels.

In well preserved specimens, the whole surface of the shell shows minute spiral ornamentation; in the adult whorls below the concavity under the anterior keel, there is a strong prominence or shoulder, ornamented with sub-microscopic threads, which juts over the excavated suture.

This species closely resembles *T. altilira* Conrad but differs in having the upper keel weaker than the lower in the young stages; in having single carinating ribs, the posterior of which becomes stronger in adult stages; and in having deeper, narrower interspaces between the carinating spirals. It is not confusable with *T. perattenuata* Heilprin or *T. altilira* Conrad *mirandana* (n. subsp.), both of which have a double upper keel. It differs from *T. guppyi* Cossmann *morantensis* (n. subsp.), and from *T. altilira* Conrad *urumacoensis* (n. subsp.) in having the weaker posterior keel of the young stages become the stronger in the adult whorls, and in having more pronounced keels with a deeper, narrower, medial concavity between them. It further differs from *T. guppyi* Cossmann and its new subspecies *morantensis* in lacking the spiral thread on the posterior slope of the latter species and subspecies.

*Age:* Miocene.

*Locality:* Common in the State of Falcón. Locality Numbers: 83B, 93 (*cf.*), 97, 121 (*cf.*), 122B, 146 (or var.), 149, 149B, 154, 155, 163, 169A, 171, 174, 180, 182, 185, 187, 193, 194A (*cf.*), 204, 216, 229, 270, 277 (or subsp. *nicholsi*), 317, 1007 (*cf.*), 1017, 1031, 1033, 1043, 1111, 1255, 1335, 1552, 1850, 1855, 1856, 1866, 1867, 1873, 1911, 1928.

**Turritella vistana nicholsi** (Williston MS.)

Pl. 23, fig. 6;  
Pl. 29, figs. 2, 5.

This subspecies is distinguished by the pronounced size of the extended keels which cause them to become unwieldy, irregular in spacing, and slovenly in appearance. The keels may droop down anteriorly or turn up posteriorly on even a single volution.

*Age:* Miocene.

*Locality:* Districts of Colina and Miranda, State of Falcón. Locality Numbers: 140, 148, 148BB, 149A, 149B, 210, 212, 301, 412, 1056 (?), 1118, 1833 (*cf.*).

**Turritella bifastigata** Nelson **maracaibensis**, n. subsp.

Pl. 30, figs. 2, 4, 6.

This subspecies is very close to *T. bifastigata* Nelson and we would refer it to this species, *sensu stricto*, except for slight but constant differences which make it advisable to separate it as a distinct subspecies.

Dr. Carl O. Dunbar of the Peabody Museum at Yale University very obligingly sent us Nelson's specimens from which *T. bifastigata* was originally described. Two of these Nelson<sup>1</sup> mentioned especially, giving the dimensions. The first one mentioned (length 61 mm., greatest diameter 19.1 mm., diameter of smallest whorl 7 mm.) we have selected for the lectotype of the species; Spieker<sup>2</sup> reviewed these species quite thoroughly and figured one of the specimens, but did not state whether it was Nelson's specimen or not. Upon examining the lectotype, we find it to be the one which Spieker figured, but for clearness we are re-figuring it, Pl. 30, fig. 1. There is only one specimen in Nelson's collection which corresponds to each he described and measured. As Spieker states (*loc. cit.*), Grzybowski described and figured this *Turritella* as a new species which

<sup>1</sup> Trans. Conn. Acad., Vol. 2, p. 189, 1870.

<sup>2</sup> E. M. Spieker. The Paleontology of the Zorritos Formation of the North Peruvian Oil Fields, pp. 63-65, Pl. 3, fig. 1, The Johns Hopkins Press, 1922.

he called *T. gothica*.<sup>1</sup>

In 1912, Pilsbry and Brown<sup>2</sup> described as a new species three whorls of a *Turritella* from Cartagena, Columbia, which is evidently of the *T. bifastigata* type, under the name of *T. cartagenensis*; as described, it is somewhat larger than most of our specimens and in the description of the base they say:

"The base is somewhat convex, and shows four very low, wide spiral welts, with the same finer spirals as the upper surface."<sup>3</sup> This would seem to indicate that it is intermediate between the Peruvian and Venezuelan forms, as the typical *bifastigata* shows about six sharp spirals or "welts" on the base, while our form is almost smooth and ornamented by numerous finer spirals of varying strength.

In 1922, Olsson<sup>4</sup> described as a new species, a form occurring in Costa Rica which is very similar to *T. bifastigata* Nelson, but until more specimens are collected to show its genetic relationship, it is hard to say whether this is of specific or subspecific rank. It differs chiefly in having a very prominent posterior swelling which overlaps the anterior suture of the preceding whorl.

The distinguishing feature in the new subspecies *maracaibensis* is the ornamentation of the base. The typical Peruvian form has five or six very prominent folds on the base of the adult whorls which in this subspecies have been changed to many small spiral threads of varying strength. On the part of the base covered by the succeeding whorls there are six or seven widely spaced spirals, somewhat stronger than the weaker intervening spiral threads. This change is probably due to a locality difference. It is easy to separate the Venezuelan forms of the *bifastigata* stock by this difference alone, because *T. bifastigata*

<sup>1</sup> Neues Jahrbuch für Min. Geol. etc., Beil. Bd. 12, p. 645, Pl. 20, fig. 10, 1899.

<sup>2</sup> Proc. Acad. Nat. Sciences of Philadelphia, 1917, pp. 34-35, Pl. 5, fig. 13.

<sup>3</sup> *loc. cit.*, p. 35.

<sup>4</sup> A. A. Olsson, Bull. Amer. Pal., Vol. 9, pp. 324-325, Pl. 17, fig. 1, 1922.



Nelson, *sensu stricto*, has the base of the whorls corrugated by very strong spiral ribs; this ornamentation makes the Peruvian form quite distinct from ours which has a smoother base with more numerous weaker spirals. The base of the whorl is somewhat convex with a rounded, carinating, anterior prominence just behind the anterior suture.

The posterior shoulder tends to be prominent and to overlap the suture to a certain extent, but less than is commonly found in the Peruvian form. In other words, the suture in this subspecies tends to be slightly more open or gaping than in *bifastigata*, *sensu stricto*, and less gaping than in the new subspecies *democraciana*.

*Age:* Miocene.

*Locality:* Common in the northern part of the State of Falcón. Locality Numbers: 70A, 70B, 71, 72, 81, 83, 86, 87, 90, 1233, 1757, 1856, 1858 (*cf.*), 1872, 1874, 1875, 1883, 1884, 1892, 2036.

***Turritella bifastigata* Nelson *democraciana*, n. subsp.** Pl. 28, fig. 3;  
Pl. 30, figs. 3, 5.

This subspecies differs from the other subspecies, *maracaibensis*, in having a nearly flat base, slightly concave in some specimens, slightly convex in others, which projects a little beyond the sides of the whorls as a basal keel; the base is almost at right angles to the sides of the whorls; the rounded area between the base and sides of the whorls in *maracaibensis* is lacking in this subspecies and replaced by the angulated anterior keel. The base of the whorl is ornamented with twenty or more small spirals of varying strength; usually there is one or more weaker, intervening, spiral threads between the stronger. The sutures are more open and gaping than in any of the similar forms.

*Age:* Miocene.

*Locality:* Common in the northern part of the State of Falcón. Locality Numbers: 70A, 70B, 70C, 80, 81, 82, 83, 83B, 84, 85, 86, 87, 90, 94, 96, 97, 103, 149B, 150B, 163, 184, 219, 1117, 1231, 1233, 1335, 1757, 1850, 1852, 1856, 1858, 1859, 1860, 1861, 1862, 1869 (?), 1872, 1883, 1908, 1911.

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## PLATES

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*Photographs by the author ; engravings by the Hurst Engraving Co.*

# PLATE 1.

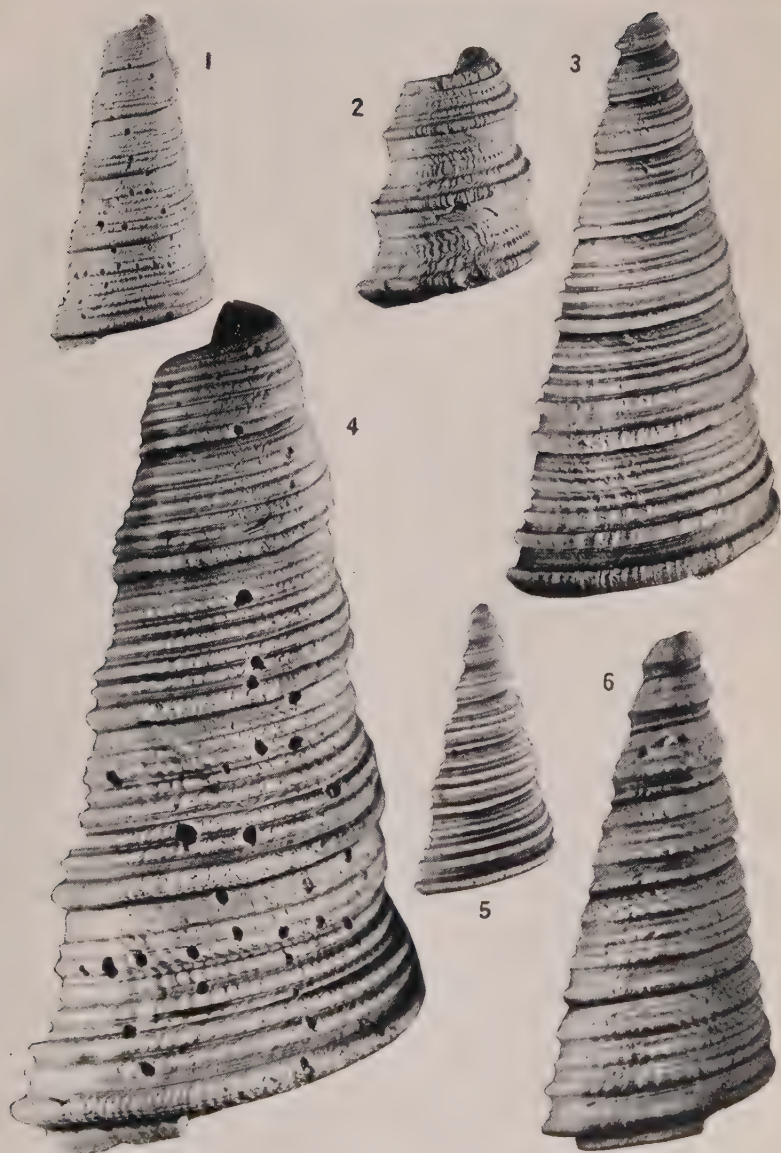
| FIG.                                                                                                                                             | PAGE |
|--------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1. <i>Turritella zuliana</i> , n. sp. Paratype from Loc. No. 6, collected by Mr. W. A. Watkins, length 20 mm., greatest diameter 7.3 mm.....     | 8    |
| 2. <i>Turritella zuliana</i> , n. sp. Paratype from Loc. No. 6, protoconch, length 3.7 mm., greatest diameter of next to last whorl 1.38 mm..... | 8    |
| 3. <i>Turritella zuliana</i> , n. sp. Paratype from Loc. No. 6, young whorls, length 3 mm., greatest diameter 1.9 mm.....                        | 8    |
| 4. <i>Turritella zuliana</i> , n. sp. Holotype, from Loc. No. 6, length 60 mm., greatest diameter 22.5 mm.....                                   | 8    |
| 5. <i>Turritella zuliana</i> , n. sp. Paratype from Loc. No. 6, length 38 mm., greatest diameter 22 mm.....                                      | 8    |
| 6. <i>Turritella zuliana</i> , n. sp. Paratype from Loc. No. 6, collected by Mr. W. A. Watkins, length 33 mm., greatest diameter 24.1 mm.....    | 8    |





## PLATE 2.

| FIG.                                                                                                                                  | PAGE |
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| 2. <i>T. zuliana</i> , n. sp. Paratype from Loc. No. 6, length 15 mm., greatest diameter 12 mm.....                                   | 8    |
| 3. <i>T. zuliana</i> , n. sp. Paratype from Loc. No. 6, enlarged to show young stages, length 13.2 mm., greatest diameter 7 mm.       | 8    |
| 4. <i>T. zuliana palmeri</i> , n. subsp. Same specimen as figure 1, enlarged. ....                                                    | 9    |
| 5. <i>T. zuliana</i> , n. sp. Paratype from Loc. No. 6, length 7 mm., greatest diameter 3.3 mm.....                                   | 8    |
| 6. <i>T. zuliana</i> , n. sp. Paratype from Loc. No. 6, enlarged to show young stages, length 9.4 mm., greatest diameter 4.5 mm. .... | 8    |



# PLATE 3.

| FIG. |                                                                                                                     | PAGE |
|------|---------------------------------------------------------------------------------------------------------------------|------|
| 1.   | <b>Turritella larensis</b> , n. sp. Paratype from Loc. No. 815,<br>length 35 mm., greatest diameter 20 mm.....      | 10   |
| 2.   | <b>Turritella larensis</b> , n. sp. Paratype from Loc. No. 815,<br>length 30 mm., greatest diameter 21 mm.....      | 10   |
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| 4.   | <b>Turritella larensis</b> , n. sp. Paratype from Loc. No. 2019,<br>length 39 mm., greatest diameter 15.2 mm.....   | 10   |
| 5.   | <b>Turritella larensis</b> , n. sp. Holotype from Loc. No. 815,<br>length 46 mm., greatest diameter 18.1 mm.....    | 10   |





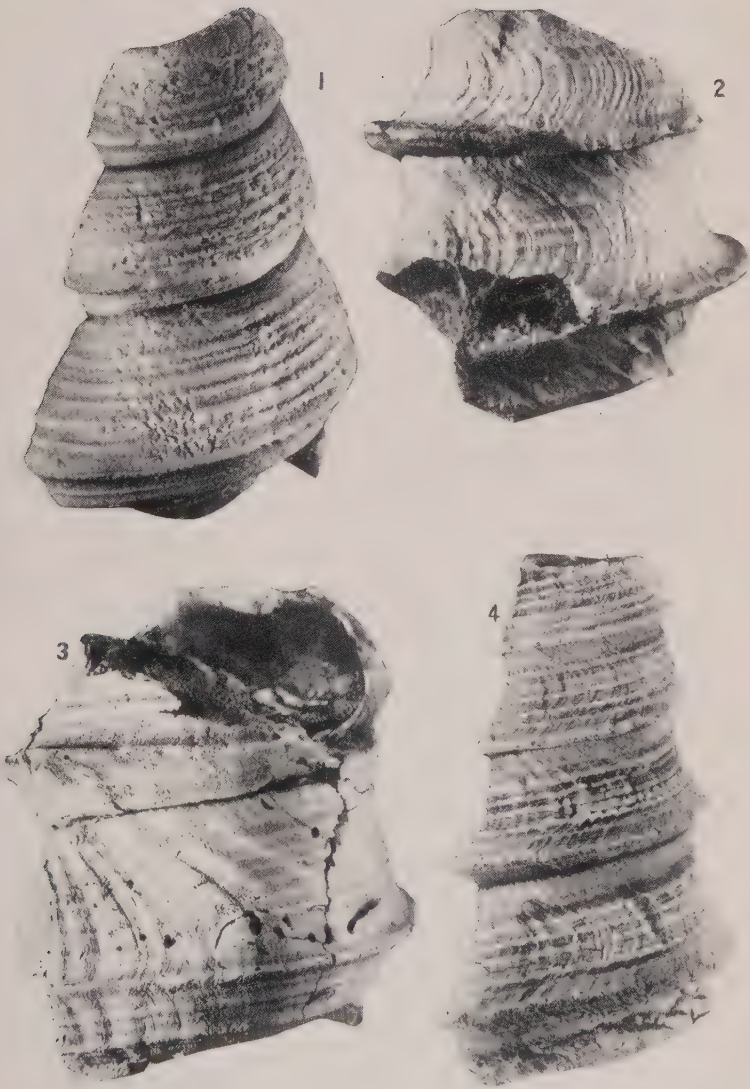
## PLATE 4.

| FIG.                                                                                                                                                                       | PAGE |
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| 1. <b>T. larensis</b> , n. sp. Paratype from Loc. No. 2019A, young whorls enlarged, length 15 mm., greatest diameter 6.5 mm.                                               | 10   |
| 2. <b>T. larensis</b> , n. sp. Paratype from Loc. No. 1761, length 67 mm., greatest diameter 26 mm. ....                                                                   | 10   |
| 3. <b>T. larensis santiagana</b> , n. subsp. Holotype from Loc. No. 2048, length 45 mm., greatest diameter 26.5 mm.....                                                    | 12   |
| 4. <b>T. larensis</b> , n. sp. Paratype from Loc. No. 2019, length 26 mm., greatest diameter 8.1 mm.....                                                                   | 10   |
| 5. <b>T. larensis</b> , n. sp. Paratype from Loc. No. 815, young whorls much enlarged, length 11.8 mm., greatest diameter of next to last whorl 6 mm.....                  | 10   |
| 6. Form intermediate between <b>T. larensis</b> , n. sp., and <b>T. larensis santiagana</b> , n. subsp. Length 48 mm., greatest diameter 27.3 mm. From Loc. No. 2019... .. | 12   |



## PLATE 5.

| FIG.                                                                                                                                                                   | PAGE |
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| 1. <b>T. robusta</b> Grzybowski <b>fredeai</b> , n. subsp. Paratype from Loc. No. 72, young whorls enlarged, length 12.6 mm., greatest diameter 8.6 mm.....            | 13   |
| 2. Form intermediate between <b>T. larensis</b> , n. sp. and <b>T. larensis santiagana</b> , n. subsp. Length 26 mm. From Loc. No. 2027.                               | 12   |
| 3. <b>T. robusta</b> Grzybowski <b>fredeai</b> , n. subsp. Paratype from Loc. No. 70A, enlarged, length 41 mm.....                                                     | 13   |
| 4. <b>T. larensis</b> , n. sp. Paratype from Loc. No. 2027, length 34 mm., greatest diameter 20.5 mm. For comparison with Pl. 4, fig. 3, and fig. 2 on this plate..... | 10   |



## PLATE 6.

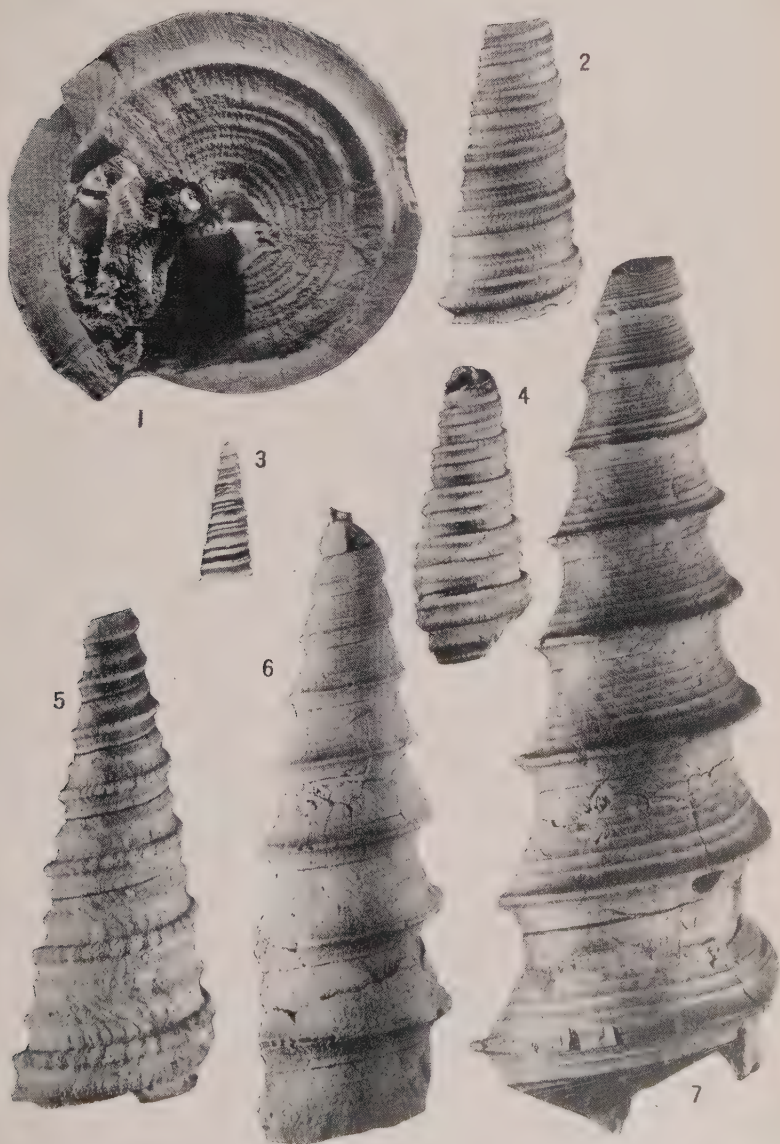
| FIG.                                                                                                                                                                                            | PAGE |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1. <b>T. laensis carrizalensis</b> , n. subsp. Paratype from Loc. No. 2022, length 36.5 mm., greatest diameter 20.5 mm.....                                                                     | 12   |
| 2. <b>T. robusta</b> Grzybowski <b>fredeai</b> , n. subsp. Paratype from Loc. No. 72, youngest whorls found, enlarged; length 21.5 mm., greatest diameter of second largest whorl 10.2 mm. .... | 13   |
| 3. <b>T. laensis carrizalensis</b> , n. subsp. Holotype from Loc. No. 2027, length 41 mm., greatest diameter 21 mm.....                                                                         | 12   |
| 4. <b>T. laensis carrizalensis</b> , n. subsp. Paratype from Loc. No. 2023, length 64 mm., greatest diameter 23 mm.....                                                                         | 12   |
| 5. <b>T. robusta</b> Grzybowski <b>fredeai</b> , n. subsp. Paratype from Loc. No. 70A, very large whorl, greatest diameter 50 mm.....                                                           | 13   |
| 6. <b>T. cauredalitoensis</b> (Williston MS.). Paratype from Loc. No. 1217, length 14 mm., greatest diameter 6 mm.....                                                                          | 15   |





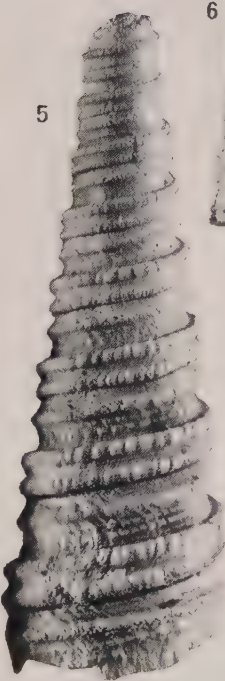
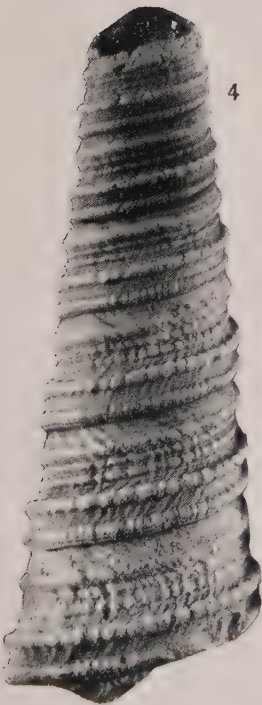
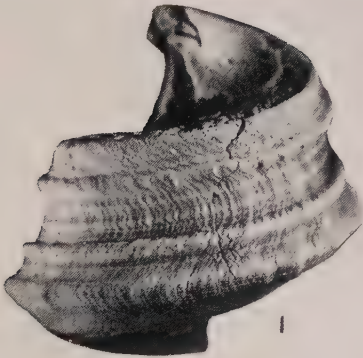
## PLATE 7.

| FIG.                                                                                                                                                              | PAGE |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1. <b>T. robusta</b> Grzybowski <b>fredeai</b> , n. subsp. Paratype from Loc. No. 72C, showing sculpture on base of whorl, greatest diameter 28 mm.....           | 13   |
| 2. <b>T. hubbardi</b> , n. sp. Paratype from Loc. No. 2040, length 22 mm., greatest diameter 10 mm. ....                                                          | 14   |
| 3. <b>T. hubbardi</b> , n. sp. Apex of holotype from Loc. No. 2040, enlarged to show the spiral ribs, length 8 mm., greatest diameter 2.9 mm.....                 | 14   |
| 4. <b>T. hubbardi</b> , n. sp. Paratype from Loc. No. 2040, length 19 mm., greatest diameter 7.5 mm.....                                                          | 14   |
| 5. <b>T. hubbardi</b> , n. sp. Paratype from Loc. No. 2040, enlarged, showing earlier whorls with strong medial rib, length 12 mm., greatest diameter 4.9 mm..... | 14   |
| 6. <b>T. robusta</b> Grzybowski <b>fredeai</b> , n. subsp. Paratype from Loc. No. 70A, length 89 mm., greatest diameter 30 mm.....                                | 13   |
| 7. <b>T. robusta</b> Grzybowski <b>fredeai</b> , n. subsp. Holotype from Loc. No. 70A, length 105 mm., greatest diameter 39 mm.....                               | 13   |



## PLATE 8.

| FIG.                                                                                                                                                                                    | PAGE |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1. <b>T. hubbardi</b> , n. sp. Paratype from Loc. No. 2040, greatest diameter 13 mm. Shows ornamentation on lower part of basal carina and slightly knobby character of the lower cord. | 14   |
| 2. <b>T. hubbardi</b> , n. sp. Paratype from Loc. No. 2019A, young whorls enlarged, length 8.8 mm., greatest diameter 4 mm.....                                                         | 14   |
| 3. <b>T. hubbardi</b> , n. sp. Holotype from Loc. No. 2040, length 30 mm., greatest diameter 10 mm.....                                                                                 | 14   |
| 4. <b>T. hubbardi</b> , n. sp. Same specimen as fig. 6, enlarged.....                                                                                                                   | 14   |
| 5. <b>T. hubbardi</b> , n. sp. Paratype from Loc. No. 2040, length 18.7 mm., greatest diameter 6.5 mm.....                                                                              | 14   |
| 6. <b>T. hubbardi</b> , n. sp. Paratype from Loc. No. 2019A, length 20 mm., greatest diameter 8 mm.....                                                                                 | 14   |
| 7. <b>T. hubbardi weeksi</b> , n. subsp. Paratype from Loc. No. 3250, collected by Mr. L. G. Weeks. A slender variation, length 26 mm., greatest diameter 9.4 mm.....                   | 15   |





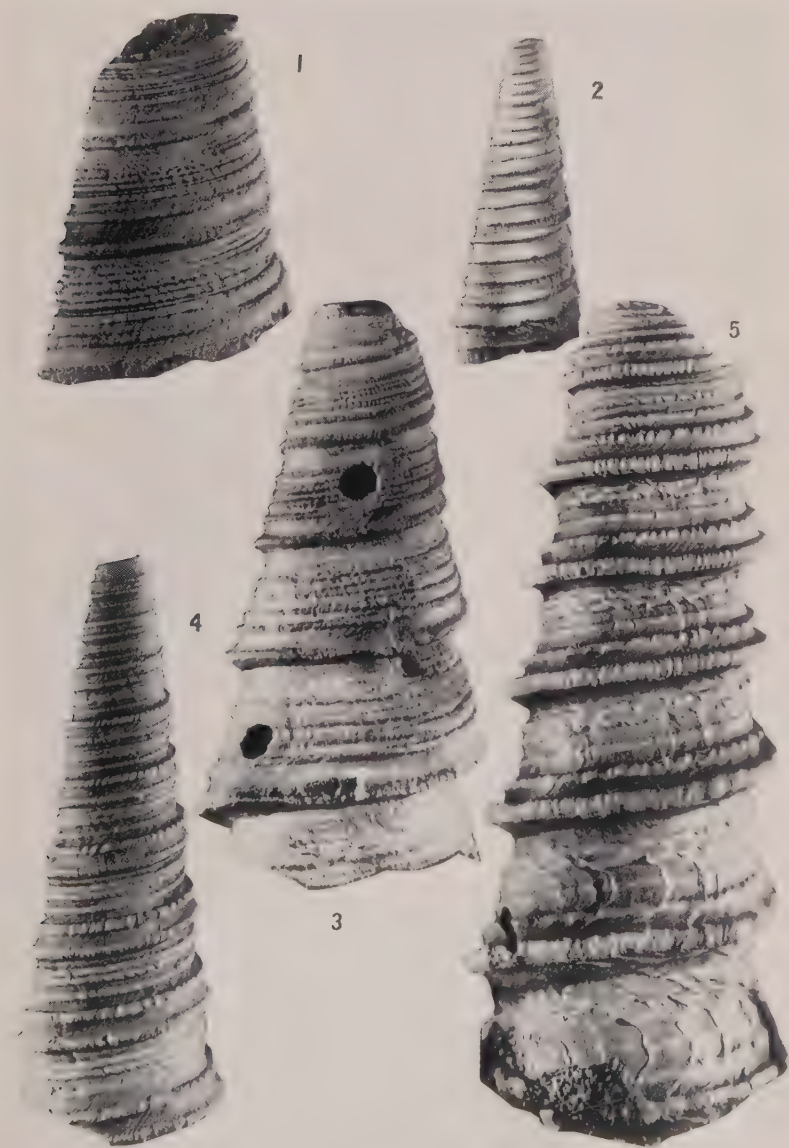
## PLATE 9.

| FIG.                                                                                                                                                | PAGE |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1. <b>T. hubbardi</b> , n. sp. Paratype from Loc. No. 2040, length 20 mm., greatest diameter 8.3 mm.....                                            | 14   |
| 2. <b>T. cauredalitoensis</b> (Williston MS.). Paratype from Loc. No. 1217, length 12 mm., greatest diameter 6.8 mm.....                            | 15   |
| 3. <b>T. cauredalitoensis liddlei</b> , n. subsp. Paratype from Loc. No. 1987, length 19 mm., greatest diameter 16.6 mm. ....                       | 16   |
| 4. <b>T. cauredalitoensis</b> (Williston MS.). Paratype from Loc. No. 1217, length 15 mm., greatest diameter 8.5 mm.....                            | 15   |
| 5. <b>T. hubbardi</b> , n. sp. Paratype from Loc. No. 2018, length 19.7 mm., greatest diameter 6.5 mm.....                                          | 14   |
| 6. <b>T. hubbardi</b> , n. sp. Holotype. Same specimen as Pl. 8, fig. 3. Length 30 mm., greatest diameter 10 mm.....                                | 14   |
| 7. <b>T. robusta</b> Grzybowski <b>fredeai</b> , n. subsp. Paratype from Loc. No. 72, enlarged to show basal sculpture, greatest diameter 45 mm.... | 13   |



# PLATE 10.

| FIG.                                                                                                                                               | PAGE |
|----------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1. <i>T. laensis guaratarensis</i> , n. subsp. Paratype from Loc. No. 1938, length 17.5 mm., greatest diameter 13.1 mm.....                        | 12   |
| 2. <i>T. cauredalitoensis</i> (Williston MS.). Paratype collected by Mr. S. H. Williston, length 21 mm., greatest diameter 9 mm.                   | 15   |
| 3. <i>T. laensis guaratarensis</i> , n. subsp. Holotype from Loc. No. 1938, length 40 mm., greatest diameter 19 mm.....                            | 12   |
| 4. <i>T. hubbardi weeksi</i> , n. subsp. Holotype from Loc. No. 3250, collected by Mr. L. G. Weeks, length 37.3 mm., greatest diameter 9.5 mm..... | 15   |
| 5. <i>T. hubbardi weeksi</i> , n. subsp. Paratype from Loc. No. 3250, collected by Mr. L. G. Weeks, length 40 mm., greatest diameter 15 mm.....    | 15   |



## PLATE 11.

| FIG.                                                                                                                                           | PAGE |
|------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1. <i>T. cauredalitoensis</i> (Williston MS.). Paratype from Loc. No. 1217, base of keel enlarged to show sculpture. Width of keel 2.5 mm..... | 15   |
| 2. <i>T. cauredalitoensis filensis</i> , n. subsp. Holotype from Loc. No. 1979, length 33 mm., greatest diameter 20 mm.....                    | 17   |
| 3. <i>T. cauredalitoensis</i> (Williston MS.). Holotype collected by Mr. S. H. Williston. Length 21 mm., greatest diameter 15 mm. ....         | 15   |
| 4. <i>T. cauredalitoensis dabajuroensis</i> , n. subsp. Holotype from Loc. No. 2027, length 28 mm., greatest diameter 14.4 mm. 17              | 17   |
| 5. <i>T. cauredalitoensis</i> (Williston MS.). Same specimen as fig. 1, length of fragment 13 mm.....                                          | 15   |
| 6. <i>T. cauredalitoensis liddlei</i> , n. subsp. Holotype from Loc. No. 1159K, length 28 mm., greatest diameter 21 mm.....                    | 16   |





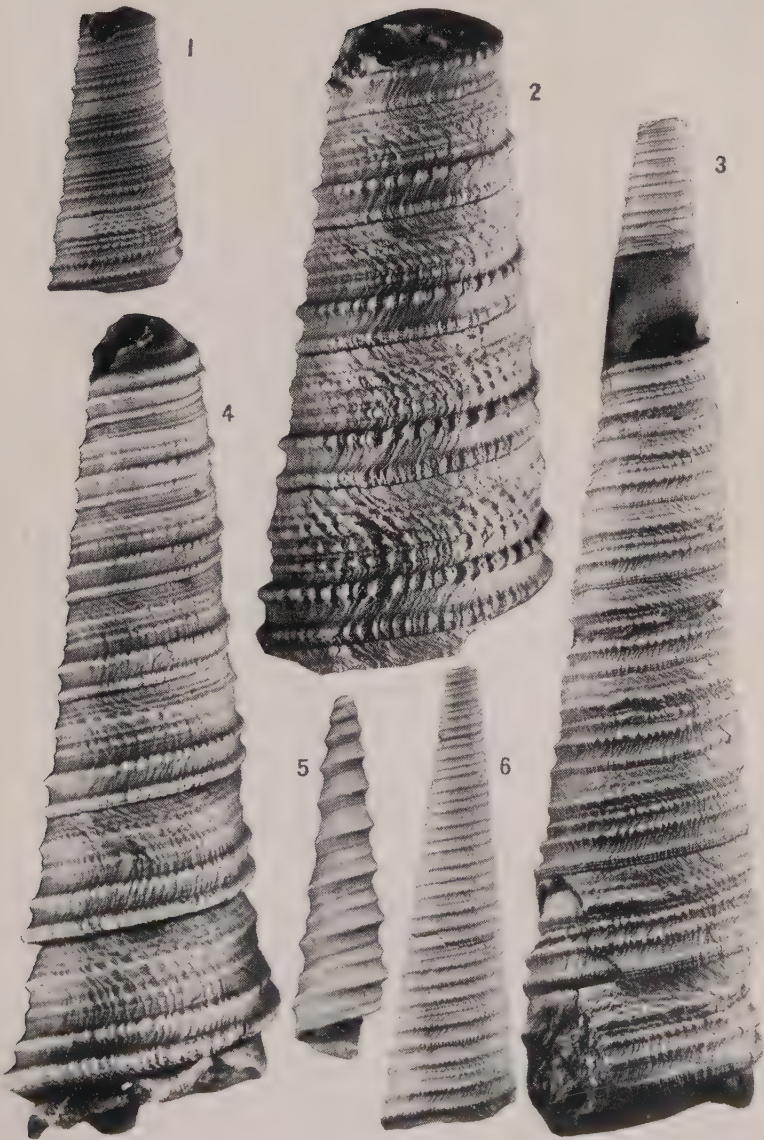
## PLATE 12.

| FIG.                                                                                                                                      | PAGE |
|-------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1. <i>T. cauredalitoensis filensis</i> , n. subsp. Paratype from Loc. No. 1979, length 37.5 mm., greatest diameter 15 mm.....             | 17   |
| 2. <i>T. gilbertharrisi</i> , n. sp. Paratype from Loc. No. 6, length 37 mm., greatest diameter 13.5 mm.....                              | 17   |
| 3. <i>T. cauredalitoensis filensis</i> , n. subsp. Paratype from Loc. No. 1979, length 38.5 mm.....                                       | 17   |
| 4. <i>T. gilbertharrisi</i> , n. sp. Paratype from Loc. No. 6, protoconch, length 4.51 mm., greatest diameter 1.27 mm.....                | 17   |
| 5. <i>T. cauredalitoensis filensis</i> , n. subsp. Paratype from Loc. No. 1217, enlarged to show sculpture, greatest diameter 19 mm. .... | 17   |
| 6. <i>T. gilbertharrisi</i> , n. sp. Paratype from Loc. No. 6. young whorls enlarged, length 11 mm., greatest diameter 3.1 mm. 17         | 17   |



# PLATE 13.

| FIG. |                                                                                                                                                                                                                       | PAGE |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1.   | <i>T. gilbertharrisi</i> , n. sp. Paratype from Loc. No. 6, length 18 mm., greatest diameter 9 mm.....                                                                                                                | 17   |
| 2.   | <i>T. gilbertharrisi</i> , n. sp. Same specimen as fig. 1, enlarged                                                                                                                                                   | 17   |
| 3.   | <i>T. gilbertharrisi</i> , n. sp. Holotype from Loc. No. 6, length 60 mm., greatest diameter 15 mm. The longest single specimen found. (The part that had been hopelessly crushed is replaced with modeling wax)..... | 17   |
| 4.   | <i>T. gilbertharrisi</i> , n. sp. Paratype from Loc. No. 6, length 20 mm., greatest diameter 7 mm.....                                                                                                                | 17   |
| 5.   | <i>T. gilbertharrisi</i> , n. sp. Paratype from Loc. No. 6, protoconch, length 4.13 mm., greatest diameter 1.22 mm.....                                                                                               | 17   |
| 6.   | <i>T. gilbertharrisi</i> , n. sp. Paratype from Loc. No. 6, length 32 mm., greatest diameter 9 mm.....                                                                                                                | 17   |





## PLATE 14.

| FIG.                                                                                                                                                                                            | PAGE |
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| 1. <i>T. gilbertharrisi</i> , n. sp. Paratype from Loc. No. 1415, young whorls enlarged, length 14.5 mm., greatest diameter 6 mm. ....                                                          | 17   |
| 2. <i>T. gilbertharrisi falconensis</i> (Williston MS.). Paratype from Loc. No. 1928, showing common appearance, length 52 mm., greatest diameter 23.2 mm. ....                                 | 19   |
| 3. <i>T. montañitensis</i> , n. sp. Paratype from Loc. No. 1939, young whorls enlarged, length 13.5 mm., greatest diameter 7.2 mm. ....                                                         | 20   |
| 4. <i>T. gilbertharrisi</i> , n. sp. Same specimen as Plate 13, fig. 6. Length 32 mm. ....                                                                                                      | 17   |
| 5. <i>T. hubbardi</i> , n. sp. Paratype from Loc. No. 2040, young whorls enlarged, length 9.5 mm., greatest diameter of smallest whorl 1.4 mm., greatest diameter of largest whorl 3.9 mm. .... | 14   |
| 6. <i>T. gilbertharrisi falconensis</i> (Williston MS.). Holotype from Loc. No. 1928, length 59 mm., greatest diameter 20 mm. ....                                                              | 19   |
| 7. <i>T. gilbertharrisi</i> , n. sp. Paratype from Loc. No. 1415, enlarged to show sculpture, length 21 mm., greatest diameter 12 mm. ....                                                      | 17   |
| 8. <i>T. gilbertharrisi falconensis</i> (Williston MS.). Paratype from Loc. No. 1127, length 38.5 mm., greatest diameter 18.7 mm. ....                                                          | 19   |



# PLATE 15.

| FIG.                                                                                                                                                                      | PAGE |
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| 1. <i>T. gilbertharrisi aguavivensis</i> , n. subsp. Holotype from Loc. No. 2019, length 22 mm., greatest diameter 11 mm.....                                             | 19   |
| 2. <i>T. montañitensis</i> , n. sp. Paratype from Loc. No. 1939, length 20.5 mm., greatest diameter 9.5 mm.....                                                           | 20   |
| 3. <i>T. gilbertharrisi falconensis</i> (Williston MS.). Paratype from Loc. No. 341, length 29.5 mm., greatest diameter 12.3 mm. ....                                     | 19   |
| 4. <i>T. gilbertharrisi falconensis</i> (Williston MS.). Paratype from Loc. No. 1067, length 41.1 mm., greatest diameter 15 mm. ....                                      | 19   |
| 5. <i>T. gilbertharrisi falconensis</i> (Williston MS.) Paratype from Loc. No. 1265, length 17 mm., greatest diameter 8.2 mm. ....                                        | 19   |
| 6. <i>T. gilbertharrisi staufferi</i> , n. subsp. Holotype, length 17 mm., greatest diameter 7.5 mm. ....                                                                 | 19   |
| 7. <i>T. gilbertharrisi falconensis</i> (Williston MS.). Paratype, from Loc. No. 1436. Enlarged to show sculpture, length 31.5 mm., greatest diameter 16 mm.....          | 19   |
| 8. <i>T. gilbertharrisi aguavivensis</i> , n. subsp. Paratype from Loc. No. 6; intervening riblet is weaker than in holotype, length 21 mm., greatest diameter 14 mm..... | 19   |
| 9. <i>T. gilbertharrisi staufferi</i> , n. subsp. Same specimen as fig. 6. ....                                                                                           | 19   |



# PLATE 16.

| FIG.                                                                                                                                            | PAGE |
|-------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1. <i>T. curamichatensis</i> , n. sp. Paratype from Loc. No. 1436, length 30 mm., greatest diameter 13.5 mm.....                                | 22   |
| 2. <i>T. montañitensis saladilloensis</i> , n. subsp. Holotype from Loc. No. 1957, length 16 mm., greatest diameter 8.2 mm.....                 | 22   |
| 3. <i>T. curamichatensis</i> , n. sp. Paratype from Loc. No. 1436, length 25 mm., greatest diameter of smallest whorl 8.2 mm.                   | 22   |
| 4. <i>T. montañitensis</i> , n. sp. Paratype, a slender variation from Loc. No. 52, length 80 mm., greatest diameter 16 mm.....                 | 20   |
| 5. <i>T. montañitensis</i> , n. sp. Paratype from Loc. No. 1939, length 17.8 mm., greatest diameter 11 mm.....                                  | 20   |
| 6. <i>T. montañitensis</i> , n. sp. Paratype from Loc. No. 1939, length 23.5 mm., greatest diameter 9 mm.....                                   | 20   |
| 7. <i>T. curamichatensis</i> , n. sp. Paratype from Loc. No. 1436, length 15.1 mm., greatest diameter 6.8 mm.....                               | 22   |
| 8. <i>T. montañitensis</i> , n. sp. Paratype from Loc. No. 2031, common appearance when weathered, length 18 mm., greatest diameter 6.8 mm..... | 20   |
| 9. <i>T. curamichatensis</i> , n. sp. Paratype from Loc. No. 1070, length 18 mm., greatest diameter 10.7 mm.....                                | 22   |
| 10. <i>T. montañitensis</i> , n. sp. Holotype from Loc. No. 1939, length 25 mm., greatest diameter 10 mm.....                                   | 20   |
| 11. <i>T. curamichatensis</i> , n. sp. Paratype from Loc. No. 1408, length 17 mm., greatest diameter 7.3 mm.....                                | 22   |
| 12. <i>T. montañitensis olcottii</i> , n. subsp. Paratype from Loc. No. No. 2052, length 24 mm., greatest diameter 18.6 mm.....                 | 21   |





# PLATE 17.

| FIG.                                                                                                                                              | PAGE |
|---------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1. <i>T. curamichatensis</i> , n. sp. Paratype from Loc. No. 1436, showing a variation with flatter whorls. Length 16.5 mm.                       | 22   |
| 2. <i>T. curamichatensis</i> , n. sp. Holotype from Loc. No. 1070, length 27 mm., greatest diameter 13 mm.....                                    | 22   |
| 3. <i>T. montañitensis</i> , n. sp. Paratype from Loc. No. 1939, length 27 mm., greatest diameter 11 mm.....                                      | 20   |
| 4. <i>T. curamichatensis</i> , n. sp. Paratype from Loc. No. 1408, length 9 mm., greatest diameter 5 mm.....                                      | 22   |
| 5. <i>T. curamichatensis</i> , n. sp. Paratype from Loc. No. 1754, length 10 mm., greatest diameter 5.5 mm. Young whorls enlarged. ....           | 22   |
| 6. <i>T. curamichatensis</i> , n. sp. Paratype from Loc. No. 1436, length 34 mm., greatest diameter of smallest whorl 6 mm.                       | 22   |
| 7. <i>T. montañitensis</i> , n. sp. Same specimen as Plate 16, fig. 6. Length 23.5 mm.....                                                        | 20   |
| 8. <i>T. montañitensis</i> , n. sp. Holotype from Loc. No. 1939, length 25 mm., greatest diameter 10 mm. Same specimen as Pl. 16, fig. 10.....    | 20   |
| 9. <i>T. curamichatensis</i> , n. sp. Paratype from Loc. No. 1436, length 22 mm., greatest diameter 12.5 mm.....                                  | 22   |
| 10. <i>T. montañitensis</i> , n. sp. Same specimen as fig. 3.....                                                                                 | 20   |
| 11. <i>T. montañitensis</i> , n. sp. Paratype from Loc. No. 1939, length 13.5 mm., greatest diameter 7.2 mm. Same specimen as Pl. 14, fig. 3..... | 20   |



# PLATE 18.

| FIG.                                                                                                                                                                | PAGE |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1. <i>T. berjadinensis</i> , n. sp. Paratype from Loc. No. 67, length 15 mm., greatest diameter 8 mm.....                                                           | 26   |
| 2. <i>T. gatunensis willistoni</i> , n. subsp. Holotype from Loc. No. 1033, length 28.8 mm., greatest diameter 7.6 mm.....                                          | 25   |
| 3. <i>T. gatunensis willistoni</i> , n. subsp. Paratype from Loc. No. 1033, length 20.5 mm., greatest diameter 8 mm.....                                            | 25   |
| 4. <i>T. gatunensis willistoni</i> , n. subsp. Paratype from Loc. No. 1856, length 18.7 mm.....                                                                     | 25   |
| 5. <i>T. gatunensis taratarana</i> , n. subsp. Paratype from Loc. No. 1033, length 30 mm., greatest diameter 9.1 mm.....                                            | 25   |
| 6. <i>T. gatunensis lavelana</i> , n. subsp. Paratype from Loc. No. 183, length 17.5 mm., greatest diameter 10 mm.....                                              | 23   |
| 7. <i>T. gatunensis taratarana</i> , n. subsp. Holotype from Loc. No. 185, length 27.3 mm., greatest diameter 10 mm.....                                            | 25   |
| 8. <i>T. gatunensis willistoni</i> , n. subsp. Variation with shallower constriction at top of whorl, from Loc. No. 93, length 19 mm., greatest diameter 7 mm. .... | 25   |
| 9. <i>T. berjadinensis colinensis</i> , n. subsp. Paratype from Loc. No. 1033, length 43 mm., greatest diameter 15 mm.....                                          | 27   |







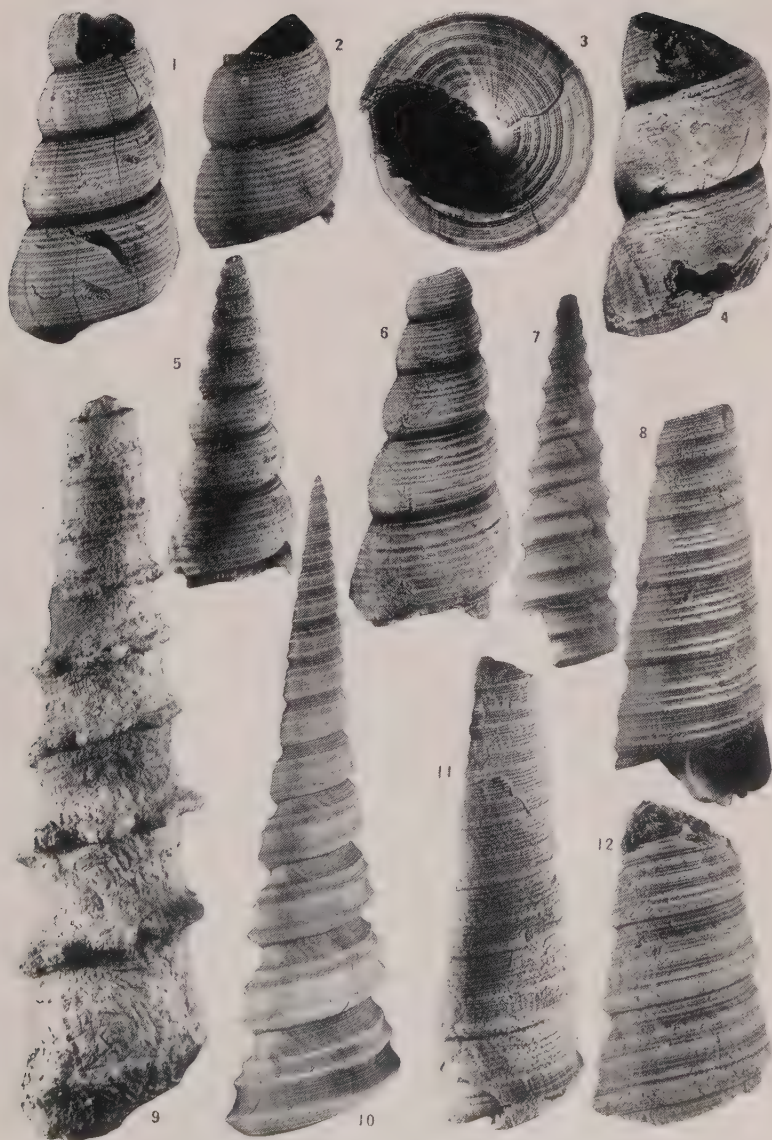
## PLATE 19.

| FIG.                                                                                                                                                                                  | PAGE |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1. <i>T. berjadinensis</i> , n. sp. Paratype from Loc. No. 1078,<br>length 17 mm., greatest diameter 8 mm.....                                                                        | 26   |
| 2. <i>T. planigyrate</i> Guppy, from Loc. No. 1131, length 15.5 mm.,<br>greatest diameter 6 mm.....                                                                                   | 29   |
| 3. <i>T. berjadinensis</i> , n. sp. Paratype from Loc. No. 1078,<br>length 14.5 mm., greatest diameter 9.8 mm.....                                                                    | 26   |
| 4. <i>T. berjadinensis</i> , n. sp. Holotype from Loc. No. 1757,<br>length 27 mm., greatest diameter 13 mm.....                                                                       | 26   |
| 5. <i>T. berjadinensis cocoditana</i> , n. subsp. Holotype from Loc.<br>No. 2207, length 35 mm., greatest diameter 9.5 mm.....                                                        | 29   |
| 6. <i>T. berjadinensis</i> , n. sp. Paratype from Loc. No. 1757,<br>length 19 mm., greatest diameter 9.6 mm.....                                                                      | 26   |
| 7. <i>T. gatunensis lavelana</i> , n. subsp. Holotype from Loc. No.<br>298, length 21 mm., greatest diameter 8 mm.....                                                                | 23   |
| 8. <i>T. berjadinensis colinensis</i> , n. subsp. Holotype from Loc.<br>No. 1033, length 37.2 mm., greatest diameter 8 mm.....                                                        | 27   |
| 9. <i>T. planigyrate</i> Guppy, collected by Professor G. D. Harris<br>from Manzanilla, Trinidad. Figured for comparison with<br>fig. 2, length 17 mm., greatest diameter 6.8 mm..... | 29   |



## PLATE 20.

| FIG.                                                                                                                                           | PAGE |
|------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1. <i>T. plebeia</i> Say <b>A-L-Owensi</b> , n. subsp. Paratype from Loc. No. 90, length 19 mm., greatest diameter 10.5 mm.....                | 31   |
| 2. <i>T. plebeia</i> Say <b>A-L-Owensi</b> , n. subsp. Paratype from Loc. No. 298, length 14 mm., greatest diameter 10.5 mm.....               | 31   |
| 3. <i>T. berjadinensis cocoditana</i> , n. subsp. Base enlarged showing sculpture, greatest diameter 12.1 mm. From. Loc. No. 2207. ....        | 29   |
| 4. <i>T. matarucana</i> , n. sp. Paratype from Loc. No. 197, greatest diameter of middle whorl 16 mm.....                                      | 31   |
| 5. <i>T. plebeia</i> Say <b>A-L-Owensi</b> , n. subsp. Paratype from Loc. No. 298, length 15 mm., greatest diameter 6 mm.....                  | 31   |
| 6. <i>T. plebeia</i> Say <b>A-L-Owensi</b> , n. subsp. Paratype from Loc. No. 90, length 19 mm., greatest diameter 9 mm.....                   | 31   |
| 7. <i>T. berjadinensis cocoditana</i> , n. subsp. Paratype from Loc. No. 2207. Young whorls enlarged. Greatest diameter about 2.3 mm.....      | 29   |
| 8. <i>T. berjadinensis warfieldi</i> , n. subsp. Paratype from Loc. No. 93, length 26 mm., greatest diameter 10.5 mm.....                      | 27   |
| 9. <i>T. montañitensis olcottii</i> , n. subsp. Holotype from Loc. No. 2050, length 41 mm., greatest diameter of next to last whorl 16 mm..... | 21   |
| 10. <i>T. berjadinensis cocoditana</i> , n. subsp. Paratype from Loc. No. 2207, length 32 mm., greatest diameter 9.3 mm.....                   | 29   |
| 11. <i>T. berjadinensis</i> , n. sp. Paratype from Loc. No. 1856, length 39.3 mm., greatest diameter of next to last whorl 12 mm. ....         | 26   |
| 12. <i>T. berjadinensis warfieldi</i> , n. subsp. Paratype from Loc. No. 1043, length 25, greatest diameter 14.4 mm.....                       | 27   |



## PLATE 21.

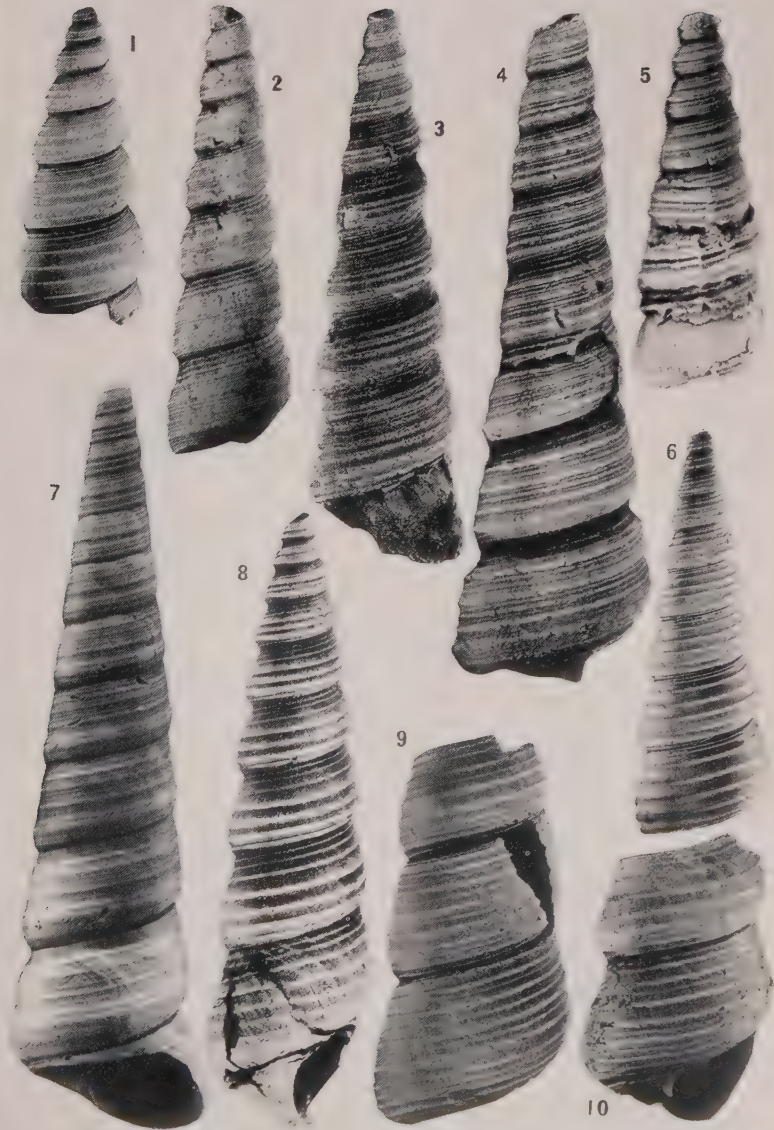
| FIG.                                                                                                                                                       | PAGE |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1. <b>T. matarucana</b> , n. sp. Paratype from Loc. No. 197, greatest diameter 14 mm.....                                                                  | 31   |
| 2. <b>T. variegata</b> Linné <b>paraguanensis</b> , n. subsp. Paratype from Loc. No. 1504, base enlarged to show sculpture, greatest diameter 19.5 mm..... | 31   |
| 3. <b>T. berjadinensis socorroensis</b> (Williston MS.). Holotype, collected by Mr. S. H. Williston. Length 31 mm., greatest diameter 12 mm.....           | 28   |
| 4. <b>T. venezuelana</b> , n. sp. Paratype from Loc. No. 6, length 18 mm., greatest diameter 7 mm.....                                                     | 32   |
| 5. <b>T. plebeia</b> Say from Jones Wharf, Md. Figured for comparison. Length 27.3 mm., greatest diameter 9 mm.....                                        | 31   |
| 6. <b>T. berjadinensis warfieldi</b> , n. subsp. Holotype from Loc. No. 118, length 26 mm., greatest diameter 10 mm.....                                   | 27   |
| 7. <b>T. variegata</b> Linné <b>paraguanensis</b> , n. subsp. Holotype from Loc. No. 1504, length 78.5 mm., greatest diameter 21 mm.....                   | 31   |
| 8. <b>T. venezuelana</b> , n. sp. Paratype from Loc. No. 6, showing protoconch. Length 2.07 mm., greatest diameter 1 mm.....                               | 32   |
| 9. <b>T. matarucana</b> , n. sp. Holotype from Loc. No. 197, length 63.5 mm., greatest diameter 15 mm.....                                                 | 31   |





## PLATE 22.

| FIG.                                                                                                                                     | PAGE |
|------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1. <i>T. venezuelana</i> , n. sp. Paratype from Loc. No. 6, length 16.5 mm., greatest diameter 7 mm.....                                 | 32   |
| 2. <i>T. cornellana</i> , n. sp. Paratype from Loc. No. 3222, length 16 mm., greatest diameter 4.5 mm.....                               | 35   |
| 3. <i>T. G-A-Weaveri</i> , n. sp. Holotype from Loc. No. 52, length 27 mm., greatest diameter 7.9 mm.....                                | 34   |
| 4. <i>T. cornellana</i> , n. sp. Paratype from Loc. No. 3222, length 20.5 mm., greatest diameter 6.3 mm.....                             | 35   |
| 5. <i>T. G-A-Weaveri</i> , n. sp. Paratype from Loc. No. 2010, length 19.5 mm., greatest diameter of next to last whorl 7 mm. ....       | 34   |
| 6. <i>T. venezuelana</i> , n. sp. Holotype from Loc. No. 6, length 19 mm., greatest diameter 7 mm.....                                   | 32   |
| 7. <i>T. variegata</i> Linné. Recent from north coast of Venezuela. Figured for comparison. Length 75 mm., greatest diameter 17 mm. .... | 31   |
| 8. <i>T. venezuelana watkinsi</i> , n. subsp. Holotype from Loc. No. 6, length 29 mm., greatest diameter 8.2 mm.....                     | 34   |
| 9. <i>T. venezuelana quirosana</i> , n. subsp. Holotype from Loc. No. 6, length 20 mm., greatest diameter 11 mm.....                     | 31   |
| 10. <i>T. venezuelana quirosana</i> , n. subsp. Paratype from Loc. No. 6, length 14.6 mm., greatest diameter 9.8 mm.....                 | 34   |



# PLATE 23.

| FIG. |                                                                                                                                                                                                                              | PAGE |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1.   | <b>T. filacarmenensis</b> , n. sp. Paratype from Loc. No. 1964, length 13 mm., greatest diameter 8 mm.....                                                                                                                   | 38   |
| 2.   | <b>T. plebeia</b> Say <b>A-L-Owensi</b> , n. subsp. Holotype from Loc. No. 90, length 27 mm., greatest diameter 16 mm.....                                                                                                   | 31   |
| 3.   | <b>T. vistana</b> , n. sp. Holotype from Loc. No. 185, length 25 mm., greatest diameter 11.9 mm.....                                                                                                                         | 46   |
| 4.   | <b>T. vistana</b> , n. sp. Paratype from Loc. No. 1552, length 22.2 mm., greatest diameter 19.5 mm.....                                                                                                                      | 46   |
| 5.   | <b>T. filacarmenensis</b> , n. sp. Paratype from Loc. No. 1987, length 22, greatest diameter 11.8 mm.....                                                                                                                    | 38   |
| 6.   | <b>T. vistana nicholsi</b> (Williston MS.). Composite of 2 specimens collected by Mr. S. H. Williston. Upper specimen: length 44 mm., greatest diameter 15.5 mm. Lower specimen: length 50 mm., greatest diameter 21 mm..... | 48   |
| 7.   | <b>T. buchivacoana</b> , n. sp. Paratype from Loc. No. 1761, young whorls enlarged, length 7.7 mm., greatest diameter 2.8 mm. ....                                                                                           | 39   |
| 8.   | <b>T. berjadinensis socorroensis</b> (Williston MS.). Paratype from Loc No. 100, length 32 mm., greatest diameter 19.5 mm. ....                                                                                              | 28   |
| 9.   | <b>T. G-A-Weaveri</b> , n. sp. Paratype from Loc. No. 52, length 11.6 mm., greatest diameter 5.4 mm.....                                                                                                                     | 34   |
| 10.  | <b>T. altilira mirandana</b> , n. subsp. Holotype from Loc. No. 154, length 22.5 mm., greatest diameter 13 mm.....                                                                                                           | 45   |
| 11.  | <b>T. mauryæ</b> , n. sp. Holotype, collected by Dr. Maury from Cercado de Mao, Santo Domingo. (Same specimen as in Bull. Amer. Pal., Vol. 5, Pl. 48, fig. 14.). Length 22.5 mm., greatest diameter 8 mm. ....               | 30   |

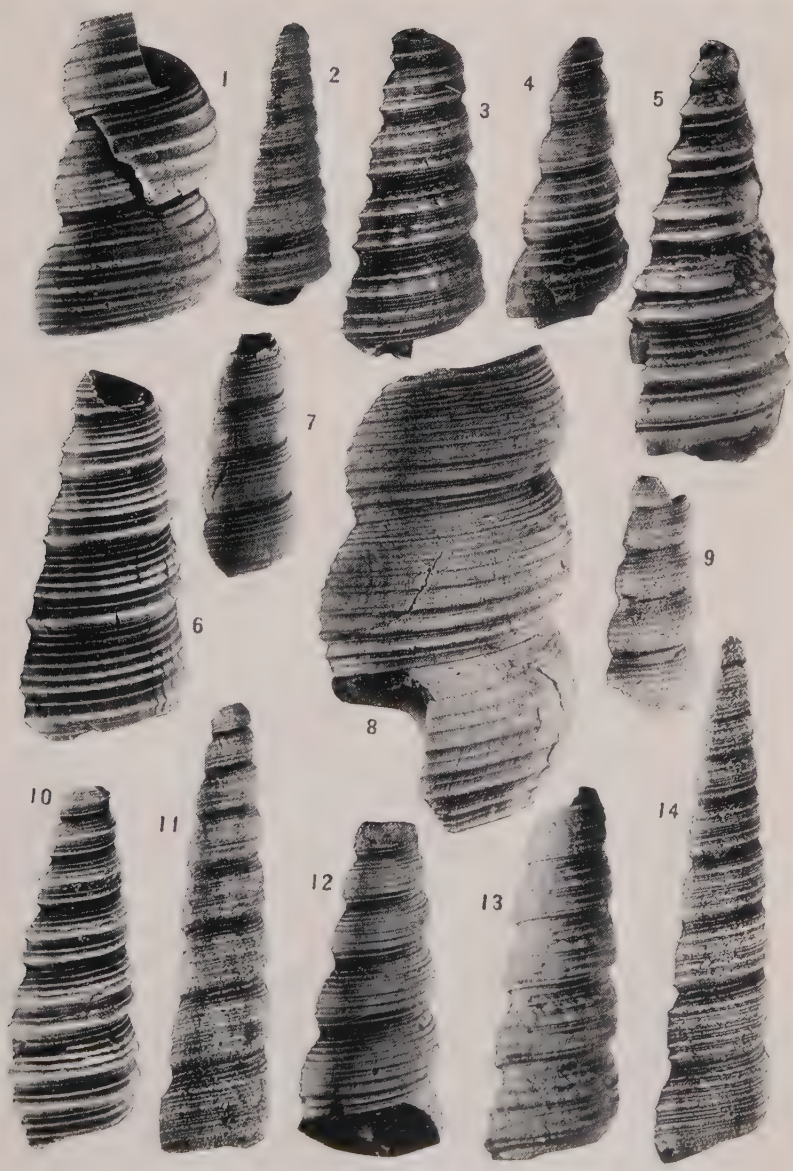






# PLATE 24.

| FIG.                                                                                                                           | PAGE |
|--------------------------------------------------------------------------------------------------------------------------------|------|
| 1. <i>T. venezuelana quirosana</i> , n. subsp. Injured specimen from Loc. No. 6, length 13.2 mm., greatest diameter 8 mm.....  | 34   |
| 2. <i>T. cornellana bolivarensis</i> , n. subsp. Paratype from Loc. No. 3222, length 17 mm., greatest diameter 6 mm.....       | 36   |
| 3. <i>T. cornellana bolivarensis</i> , n. subsp. Paratype from Loc. No. 3222, length 11 mm., greatest diameter 5 mm.....       | 36   |
| 4. <i>T. G-A-Weaveri</i> , n. sp. Paratype from Loc. No. 52, length 9.4 mm., greatest diameter 3.5 mm.....                     | 34   |
| 5. <i>T. boweni</i> , n. sp. Paratype from Loc. No. 1217, length 11 mm., greatest diameter 4.5 mm.....                         | 36   |
| 6. <i>T. boweni</i> , n. sp. Holotype from Loc. No. 1217, length 17 mm., greatest diameter 8 mm.....                           | 36   |
| 7. <i>T. andreasi</i> (Williston MS.). Paratype from Loc. No. 1217, length 12 mm., greatest diameter 5 mm.....                 | 37   |
| 8. <i>T. andreasi</i> (Williston MS.). Holotype, collected by Mr. S. H. Williston, length 22.3 mm., greatest diameter 12.1 mm. | 37   |
| 9. <i>T. andreasi</i> (Williston MS.). Paratype from Loc. No. 1217, length 10 mm., greatest diameter 4 mm.....                 | 37   |
| 10. <i>T. boweni</i> , n. sp. Paratype from Loc. No. 1217, length 13 mm., greatest diameter 5 mm.....                          | 36   |
| 11. <i>T. cornellana</i> , n. sp. Paratype from Loc. No. 3222, length 16 mm., greatest diameter 4 mm.....                      | 35   |
| 12. <i>T. andreasi</i> (Williston MS.). Paratype from Loc. No. 1217, length 18 mm., greatest diameter 7 mm.....                | 37   |
| 13. <i>T. cornellana bolivarensis</i> , n. subsp. Holotype from Loc. No. 3222, length 21 mm., greatest diameter 8 mm.....      | 36   |
| 14. <i>T. cornellana</i> , n. sp. Holotype from Loc. No. 3222, length 15.5 mm., greatest diameter 3.5 mm.....                  | 35   |



# PLATE 25.

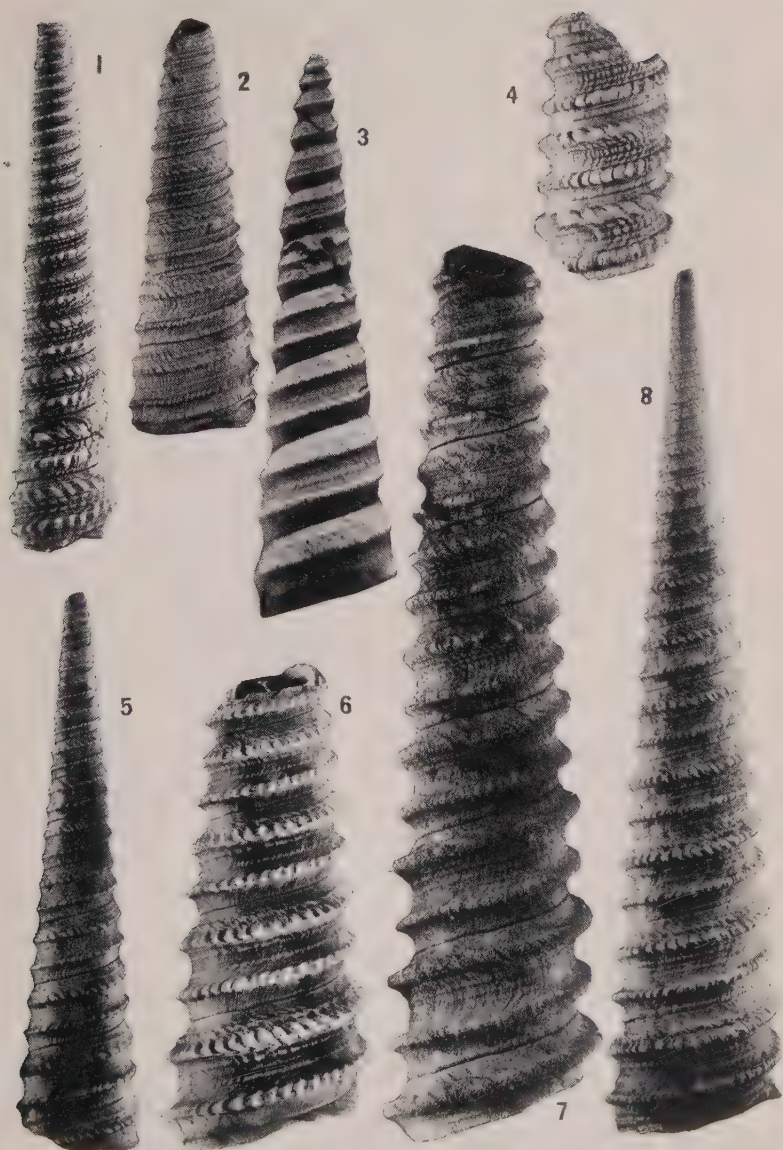
| FIG.                                                                                                                                  | PAGE |
|---------------------------------------------------------------------------------------------------------------------------------------|------|
| 1. <i>T. buchivacoana cañonensis</i> , n. sp. Holotype from Loc. No. 341, length 13 mm., greatest diameter 11.6 mm.....               | 40   |
| 2. <i>T. andreasi</i> (Williston MS.). Paratype from Loc. No. 1139, length 15.4 mm., greatest diameter 8.3 mm.....                    | 37   |
| 3. <i>T. boweni</i> , n. sp. Paratype from Loc. No. 1217, length 10 mm., greatest diameter 6.1 mm.....                                | 36   |
| 4. <i>T. filacarmenensis</i> , n. sp. Paratype from Loc. No. 1979, greatest diameter of upper whorl 6.5 mm.....                       | 38   |
| 5. <i>T. buchivacoana cañonensis</i> , n. subsp. Paratype from Loc. No. 341, length 13.5 mm., greatest diameter 7 mm.....             | 40   |
| 6. <i>T. filacarmenensis</i> , n. sp. Holotype from Loc. No. 1987, length 16 mm., greatest diameter 12 mm.....                        | 38   |
| 7. <i>T. buchivacoana</i> , n. sp. Paratype from Loc. No. 2023, length 15 mm., greatest diameter 9 mm.....                            | 39   |
| 8. <i>T. buchivacoana</i> , n. sp. Paratype from Loc. No. 1942, length 14 mm., greatest diameter 9.8 mm.....                          | 39   |
| 9. <i>T. buchivacoana</i> , n. sp. Holotype from Loc. No. 2019, length 29 mm., greatest diameter of next to last whorl 9 mm. ....     | 39   |
| 10. <i>T. filacarmenensis</i> , n. sp. Paratype from Loc. No. 1964, length 16.1 mm., greatest diameter 7.4 mm.....                    | 38   |
| 11. <i>T. elmenensis</i> , n. sp. Holotype collected by the Miranda Exploration Company, length 23 mm., greatest diameter 10 mm. .... | 41   |
| 12. <i>T. filacarmenensis</i> , n. sp. Paratype from Loc. No. 1979, length 4.6 mm. Young whorls enlarged.....                         | 38   |



# PLATE 26.

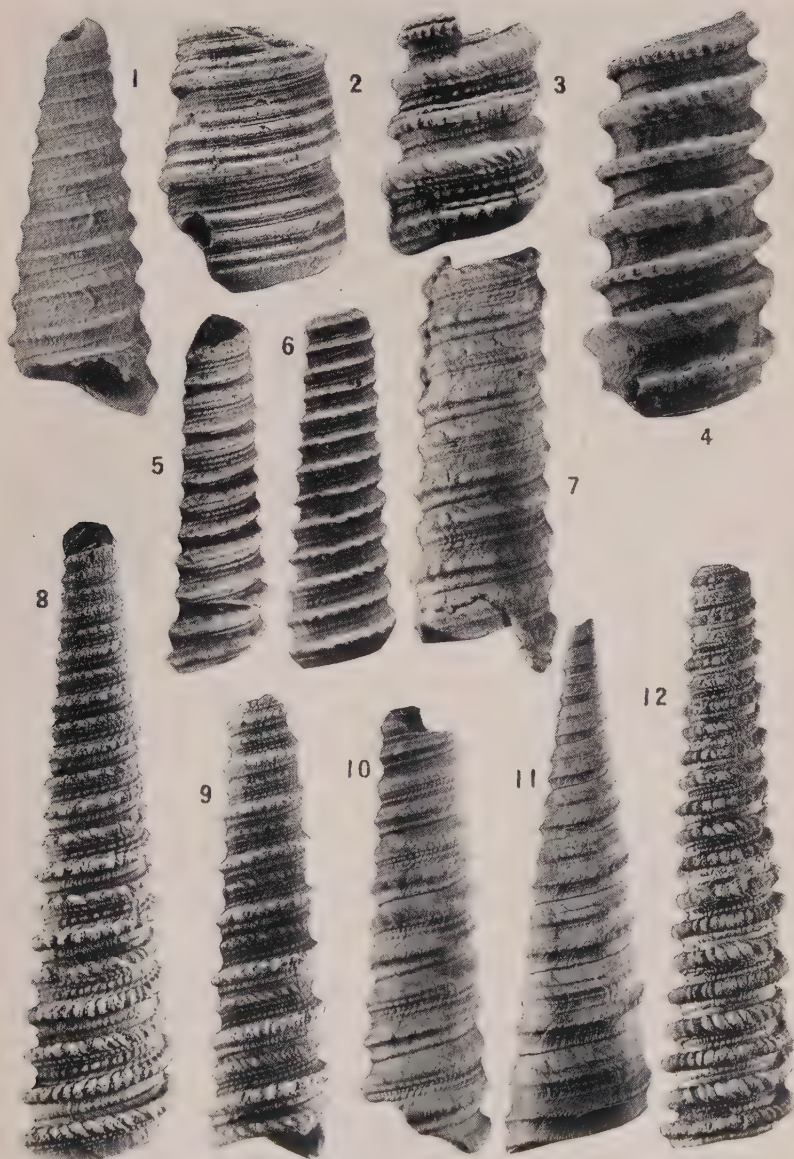
| FIG.                                                                                                                                                                                 | PAGE |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1. <i>T. altilira</i> Conrad, from Gatun, C. Z., Loc. No. 1101, figured for comparison. Length 25 mm., greatest diameter 5.1 mm. ....                                                | 45   |
| 2. <i>T. carlottæ</i> , n. sp. Paratype collected by Dr. Maury from Río Gurabo at Los Quemados, Santo Domingo. Length 21 mm., greatest diameter 7 mm.....                            | 43   |
| 3. <i>T. guppyi</i> Cossmann <i>morantensis</i> , n. subsp. Paratype with protoconch from Bowden, Morant Bay, Jamaica, Loc. No. 1109. Length 7.35 mm., greatest diameter 1.7 mm..... | 42   |
| 4. <i>T. altilira</i> Conrad <i>urumacoensis</i> , n. subsp. Paratype from Loc. No. 206A, length 14.8 mm., greatest diameter 8 mm. ....                                              | 44   |
| 5. <i>T. guppyi</i> Cossmann <i>morantensis</i> , n. subsp. Paratype from Bowden, Morant Bay, Jamaica, Loc. No. 1109. Length 22.2 mm., greatest diameter 4.9 mm.....                 | 42   |
| 6. <i>T. guppyi</i> Cossmann <i>morantensis</i> , n. subsp. Paratype from Bowden, Morant Bay, Jamaica, Loc. No. 1109. Length 27 mm., greatest diameter 12.3 mm.....                  | 42   |
| 7. <i>T. altilira</i> Conrad <i>urumacoensis</i> , n. subsp. Holotype, collected by Mr. S. H. Williston, length 72 mm., greatest diameter 18.8 mm.....                               | 44   |
| 8. <i>T. guppyi</i> Cossmann <i>morantensis</i> , n. subsp. Holotype from Bowden, Morant Bay, Jamaica, Loc. No. 1109. Length 59 mm., greatest diameter 12.6 mm.....                  | 42   |





# PLATE 27.

| FIG. |                                                                                                                                                                                                                                      | PAGE |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1.   | <i>T. guppyi</i> Cossmann. Holotype, photograph by Dr. R. S. Eassler of the U. S. National Museum. Length of cast 17.5 mm., greatest diameter 8 mm.....                                                                              | 42   |
| 2.   | <i>T. berjadinensis socorroensis</i> (Williston MS.). Paratype, collected by Mr. S. H. Williston, length 23 mm., greatest diameter 13 mm.....                                                                                        | 28   |
| 3.   | <i>T. altilira</i> Conrad <i>urumacoensis</i> , n. subsp. Paratype from Loc. No. 118, length 19 mm., greatest diameter 13.5 mm.                                                                                                      | 44   |
| 4.   | <i>T. altilira</i> Conrad <i>urumacoensis</i> , n. subsp. Paratype from Loc. No. 118, length 31 mm., greatest diameter 16 mm.....                                                                                                    | 44   |
| 5.   | <i>T. altilira</i> Conrad <i>urumacoensis</i> , n. subsp. Paratype from Loc. No. 118, length 38.5 mm., greatest diameter 8 mm.....                                                                                                   | 44   |
| 6.   | <i>T. altilira</i> Conrad <i>urumacoensis</i> , n. subsp. Paratype from Loc. No. 121, length 28 mm., greatest diameter 9 mm.....                                                                                                     | 44   |
| 7.   | <i>T. altilira</i> Conrad <i>urumacoensis</i> , n. subsp. Paratype from Loc. No. 121, length 14 mm., greatest diameter 5 mm.....                                                                                                     | 44   |
| 8.   | <i>T. vistana</i> , n. sp. Paratype from Loc. No. 1033, length 30 mm., greatest diameter 8 mm.....                                                                                                                                   | 46   |
| 9.   | <i>T. vistana</i> , n. sp. Paratype from Loc. No. 1033, length 22 mm., greatest diameter 6 mm.....                                                                                                                                   | 46   |
| 10.  | <i>T. altilira</i> Conrad <i>urumacoensis</i> , n. subsp. Paratype from Loc. No. 121, length 22 mm., greatest diameter 6.2 mm.....                                                                                                   | 44   |
| 11.  | <i>T. carlottæ</i> , n. sp. Holotype, collected by Dr. Maury from Río Gurabo at Los Quemados, Santo Domingo. (Same specimen as figured in Bull. Amer. Pal., Vol. V, Pl. 48, fig. 15.) Length 20.5 mm., greatest diameter 5.5 mm..... | 43   |
| 12.  | <i>T. vistana</i> , n. sp. Paratype from Loc. No. 122B, length 34 mm., greatest diameter 7.5 mm.....                                                                                                                                 | 46   |



# PLATE 28.

| FIG. |                                                                                                                                                                  | PAGE |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1.   | <i>T. plebeia</i> Say <b>A-L-Owensi</b> , n. subsp. Paratype from Loc. No. 298, length 12 mm., greatest diameter 7.3 mm.....                                     | 31   |
| 2.   | <i>T. altilira</i> Conrad <b>mirandana</b> , n. subsp. Paratype from Loc. No. 154, length 18 mm., greatest diameter 9.1 mm.....                                  | 45   |
| 3.   | <i>T. altilira</i> Conrad. Collected from Gatun, C. Z., Loc. No. 1101. Figured for comparison. Length 47 mm., greatest diameter 11 mm.....                       | 45   |
| 4.   | <i>T. guppyi</i> Cossmann <b>morantensis</b> , n. subsp. Paratype from Loc. No. 1109, Bowden, Morant Bay, Jamaica. Length 60 mm., greatest diameter 14.6 mm..... | 42   |
| 5.   | <i>T. gilbertharrisi</i> <b>falconensis</b> (Williston MS.). Holotype. Same specimen as Pl. 14, fig. 6. Length 59 mm.....                                        | 19   |

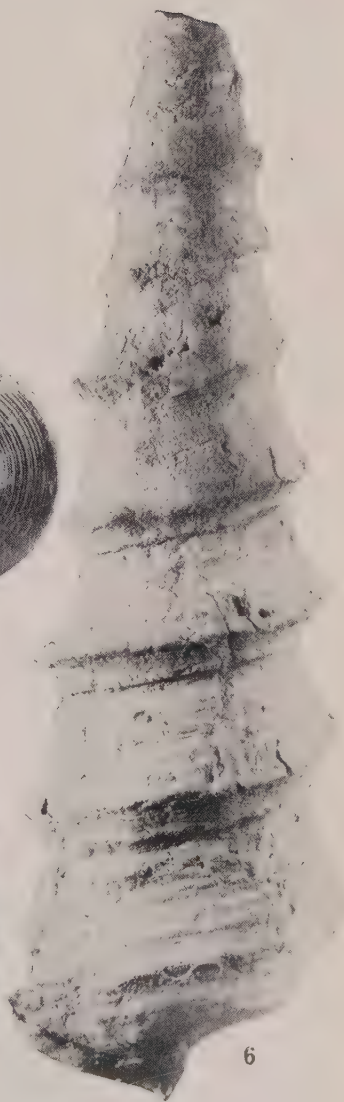
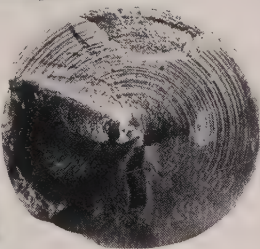
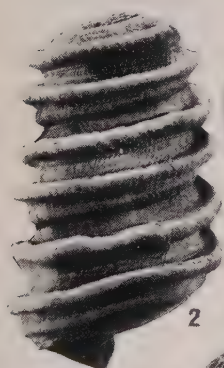
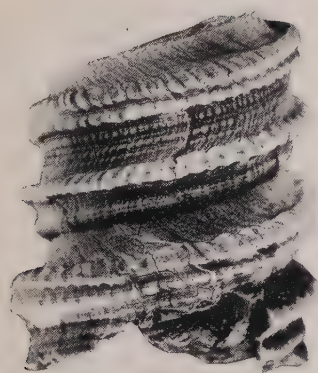






## PLATE 29.

| FIG.                                                                                                                                                       | PAGE |
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